THE

AMERICAN JOURNAL

OF THE MEDICAL SCIENCES.

JUNE, 1894.

NEPHRITIS IN ITS SURGICAL ASPECTS.[1]

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Part I.—Introductory.

So many inflammations of the kidney have a surgical side that I must define the limits of my subject. I shall speak only of suppurative pyelonephritis, that common malady sometimes called "the surgical kidney," and I shall consider it both as it occurs spontaneously and as a complication of vesical disorder, the drift of my discussion to be a consideration of etiology and of the practical means of preventing the malady.

The subject, though well worn, is not threadbare. Investigators are still struggling with its problems, although much light has been already thrown into its dark corners—light which is reflected in the routine methods of the practical surgeon of to-day, enabling him to conduct his patient more safely past points of danger than was in any way possible a few years ago.

Much of this light emanates from laboratorial researches carried on abroad—notably in France, under the inspiration of Guyon—and from these researches I must borrow largely in introducing my subject.

It has been contended that the name "surgical kidney" is a misnomer (C. Lucas), since its existence is often due to the lack of intelligent surgery, and that it would be as logical to name a riot a "policeman's mob," because it was due to the absence of that enforcer of the law; but

[1] Read before the Congress of American Physicians and Surgeons, Washington, May 31, 1894.

the distinction is captious. The term may well remain, since the surgical kidney is a complication for the most part of surgical disorder, and its study within the domain of surgical pathology.

Modern demonstration shows in a manner which the logical mind must accept that suppuration in the kidney, as elsewhere, is associated with the existence of micro-organisms, and due directly to their presence. Yet a distinction is here necessary, as it is, for instance, in the contemplation of contagious disorders, for the production of which, as Bouchard aptly puts it, something more is necessary than the accidental encounter of a man and a microbe; the soil must be suitable, the conditions must be favorable, or the seed does not take root.

I cannot discuss the controversial aspect of microbic infection, as this paper aims at being practical, but must ask you to accept, what wide demonstration at many hands has proved, that without the co-operation of microbic infection there is no suppuration in the urinary passages.

Since Pasteur opened the subject in 1859—less than a lifetime ago—by noticing that boiled urine remained sweet, while dust brought decomposition to it, and, with Van Tieghem, fastened the blame upon what he called "torules ammoniacales," all through the line of Traube, Cohn, Fels and Ritter, Hiller, Niemeyer, Klebs, Lister, Lancereaux, Lepine, Roux, Albarran, Hallé, Krögius, Schnitzler, Rovsing, Clado, Chabrié, Escherich, Morell, Achard, Renant, Reblaud, Guyon, and a host of others, the demonstration has been progressive, and no escape has been possible from the flat conclusion: In the urinary tract, no microbes no suppuration. The protest of Enriquez is by the way, together with that of Manotti and Bachiocchi and others—for that even normal urine may contain germs, and that the kidney may eliminate such, without the necessity of accompanying renal inflammation, may be granted; we have only to revert to Bouchard's aphorism of the man and the microbe: The seed may be old, it may be unsuitable; the soil may not be ready; surely every man in an epidemic does not acquire disease.

The healthy urethra is well known to be the habitual residence of numerous micro-organisms, some of them pathogenic, just as the external integument is; yet they cause no disease under normal conditions. So much at home are they, indeed, and so intimately bedded among the cells and in the ducts of the mucous glands, that no amount of prolonged irrigation with hot water, boric acid, or even 1 in 1000 nitrate of silver solution at the hands of Petit and Wassermann could succeed in rendering this membrane sterile; inoculation of its mucus (after irrigation) in bouillon tubes always gave positive results.

This, at least not aseptic, condition of the urethral mucous membrane stops in health at the cut-off muscle. Beyond and above all is pure, and Guyon with his pupils, as well as others, have amply demonstrated that urine taken aseptically from the bladder is sterile.

How and why, then, in cases of suppuration does it become contaminated?

The *How* is clearly by way of the introduction of micro-organisms, either by (1) propagation along the mucous surface by reason of local damage to the deep urethral membrane [tubercle, cancer, stone, bruising violence, erotic excitement, gonorrhœa, gouty congestion, enlarged prostate—or spontaneously]; (2) introduction by the surgeon upon his instruments; (3) bursting into the urinary tract of some extraneous focus of suppuration; (4) transmission through the unbroken tissues from a neighboring focus—it has been even alleged that the bacterium coli commune may get through from the rectum and do its work upon the mucous membrane of a bladder ready to receive it (5) by descent from the blood downward through the kidney—but this, except the wedge-shaped pyæmic foci, is very uncommon, and, as in Bouchard's suppurative nephritis occurring during the course of a general infectious malady, the suppuration commencing in the kidney, usually remains there and does not descend into the bladder.[1]

I cannot halt here to discuss these various alleged methods of invasion, but pass on to the more important *Why?*

Why do micro-organisms produce suppuration in some instances and not in others? This opens the question of preparation of the soil.

As early as 1873 Fels and Ritter, by inoculating the bladders of dogs, produced ammoniacal urine and cystitis—but only on condition of ligating the urethra. Upon loosening this ligature the bladder promptly resumed its condition of health. So Guyon, Albarran, Guiard, and many others, introducing pure cultures of micro-organisms into the healthy bladders of animals, fail to set up cystitis unless to the microbic germ there be added other factors, such as ligating the urethra to produce forced retention, or wounding the bladder. Certain micro-organisms have proved themselves more virulent than others, just as certain subjects are exceptionably susceptible, and Schnitzler claims that with the "urobacillus liquefaciens septicus" he can produce cystitis without tying the urethra. This urobacillus is now believed to be identical with the bacterium coli commune; more evidence is therefore needed. Barlow has recently contributed some testimony on this point.

But Guyon, Petersen, Albarran, and many others have repeatedly proved that retention, ligating the urethra, trauma—not one of these causes alone will produce cystitis, and that anyone of them plus the proper germ will do it. Straus and Germont clearly proved that simple ligature of the ureter, aseptically performed, does not occasion inflammation of the kidney, but produces dilatation, and then atrophy; while Charcot and Gombault, with equal clearness, have demonstrated that septic ligation of the ureter does produce the suppurating kidney.

[1] Albarran has produced descending pyelitis experimentally.

That trauma prepares a soil for microbic infection is beautifully illustrated by Albarran. He showed that the blood might be a channel of infection by inoculating one ureter and ligating it below; then finding both kidneys implicated, as being spots "minoris resistentiæ"—the ligated side because of congestion and of direct infection, the other on account of its hyperactivity from having had double work to do. Then Albarran injected his bacterium pyogenes directly into a bloodvessel in a number of animals, and got plenty of embolic abscesses in every instance, but found the kidneys free in all save one. To study the effect of injury plus germs, he therefore contused one kidney in a rabbit and injected a pure bouillon culture of bacterium pyogenes into its ear. The next day this kidney was already in commencing suppuration. He produced nephritis also by injecting the ureter (and ligating) with streptococcus pyogenes, and with staphylococcus aureus as well.

Indeed, how many kinds of germs there may be capable of setting up suppurative nephritis, I do not know. That there are a number seems certain; but there still exists confusion among authorities, and the last word has not been spoken. Nor is the method of action quite agreed upon, Rovsing believing that ammoniacal fermentation of urine is a factor of prime importance, while Guyon upholds that this feature is secondary. That it is not always essential is shown by the fact that there is such a thing as acid cystitis. Uncomplicated tubercular cystitis is an example in point.

As for the single germ named by investigators seeming to have the most pernicious qualities, it appears to be growing more and more clear that this germ is the bacterium coli commune,[1] a bacillus similar to, if not identical with that commonly found in the colon under all circumstances.

This it seems is the same as the urobacillus septicus, and as the septic bacterium discovered by Bouchard in 1879, by Clado and by Hallé in 1887, studied intimately in 1888 by Albarran and Hallé, and by Albarran in 1889 as the bacterium pyogenes, by Rovsing in 1889 as the coccobacillus ureæ pyogenes, by Chabrié in 1892 as the uro-bacillus non-liquefaciens septicus, by Morell as the bacterium lactis ærogenes, by Krögius, Achard and Renant, Reblaud, etc.; all these seem to be the same time-honored bacterium coli commune. This germ is most often found in bad cases. Associated with it, or alone, may be found also the staphylococcus pyogenes aureus and the streptococcus pyogenes.

Accepting then, from experimental data, that suppurative inflammation along the urinary tract demands for its production, first, a microorganism; second, a soil properly prepared by overdistention, congestion, or trauma, let us next turn to the clinical side of the picture, and see whether the same conditions obtain.

[1] 4 to 6μ long, 2μ broad, with rounded ends; staining by Weigert's method.

Surely they do. The young and vigorous bladder and kidney do not suppurate except for trauma—injury, stone, tumor, stricture, gonococcus, tubercle; in weakly young subjects they do suppurate when depressed nerve force and atony of the circulation, or intense congestion from repeated erotic cause, may be presumed to prepare the way through the congestive process. We all know with what liberty young subjects may be handled instrumentally. The slight disturbance following sounding or catheterism quickly subsides; urethral fever and surgical kidney are here almost unknown.

Again, in youth and vigorous manhood, when the bladder is strong and capable of emptying itself, when there is no atony—in cases of retention from fever, coma, spasmodic stricture, with what carelessness the catheter may be used, and no evil result follow; and even in such cases, although there be added traumatism and congestion produced by stone, stricture, gonorrhœa, or even tubercle; here, too, in the young and vigorous, even moderate care and cleanliness yield results in the main satisfactory; high grades of inflammation are not produced by careful instrumentation, and ascending pyelitis is wholly exceptional. But in these cases a muscularly healthy bladder is presumed to exist, one capable of demonstrating, by frequently and entirely emptying itself, the value of Guyon's maxim, "The bladder is the guardian of the ureters."

But how does the picture change when in waning life, be it premature or in the fulness of time, the nerve force fails, the bladder loses its expulsive tone, its muscular wall becomes replaced by tissue more or less fibrotic, crowding out and atrophying the muscular fibre, when there is more or less residual urine, when the ureters are dilated. Now let there be occasion for the use of any instrument in the bladder, and it requires often the utmost skill and attention, with all the asepsis and antisepsis which we can command, to avert septic conditions which readily climb the ureter through the door thrown open by previous preparation of the soil, and, producing the true surgical kidney, terminate the life of the patient, positively by reason of the surgeon's interference. Here the soil is rich and ready for the seed—the surgeon plants the seed in the urine, until then clear, and the patient reaps the harvest.

The physical soil is prepared by anything that weakens the bladder, congests or bruises its surface. Thus all antecedent conditions of disease for which the aid of the surgeon is invoked—stricture, prostatic enlargement, stone, tumor, retention—prepare the soil more or less, and it behooves the surgeon to be watchful about sowing the seed.

Turning again to the experimental field, let us study briefly the effect of the most active of the causes which prepares the way for kidney invasion from below. This cause is retention of urine or bladder tension, anything that interferes with the free and perfect passage of the urine downward from the kidney.

James has determined by experimentation the normal urinary pressure within the ureter to be about two and one-half centimeters of mercury, and Hermann has shown that a pressure of six centimetres almost suppresses the urea in the urine. Guyon, Albarran and others, have proved by experiment upon animals, that sudden closure of the ureter does not lead to a distention of this canal. The kidney does become distended, then some of its contents are reabsorbed, next the kidney undergoes atrophy. This circumstance caused Guyon to suggest that when the ureter was accidentally severed in some abdominal operation, the duct should be ligated aseptically and the kidney left to atrophy, thus saving the patient a needless nephrectomy. The kidney will not suppurate. Crooke found this atrophy of the kidney to have taken place in a female where the ureter had been aseptically occluded by a cyst of the broad ligament. The ureter was not dilated.

All this question of the effect upon the kidney of rapid closure of the ureter and of the slower process of obstruction below has been experimentally elucidated by Guyon upon dogs.[1] Absolute aseptic ligature of the ureter leaves the duct unaltered, causes dilatation, then atrophy of the kidney, the papillæ becoming flattened, the tubes dilating, the kidney substance getting sclerotic, and then withering. Tension in the kidney at first increases quickly, as shown by the mercurial manometre, to 40 millimetres in twenty minutes, and to 73 in an hour, dropping again swiftly to 44 millimetres in four and a half hours. After twenty-six days it bebecomes 11 millimetres, and after sixty-two days 3 millimetres, which is about what James has shown to be the normal pressure.

When, however, the obstruction is less acute, as when the urethra is ligated, polyuria is a first result, with a progressve diminution in the quantity of urea contained in the urine, shown by the fact that the urine in the bladder always contains more urea than that taken from the ureters, the latter more than can be obtained from urine found in the pelvis of the kidney, circumstances which go to prove three things: first, that the dilatation of the ureter takes place from above downward; second, that the diminution in the secretion of urea is progressive, and third, that regurgitation of urine does not take place; what was first excreted goes to the bladder, the last remains in the kidney. In vesical hæmaturia from acute retention of urine the fluid in the ureters remains pale, that in the bladder being bloody.

The slowly progressive dilatation of the ureter from above downward, and not from below upward, is admirably brought out in the thesis of Hallé.

In some cases of stricture, when the vesical muscle continues powerful, it is probable that the ureters are forced, because their orifices are

[1] Experiments conducted by Allbaran and Chabrié.

found widely dilated, but in most instances, and notably in the case of thin-walled, weak bladders, or in thick-walled, sclerosed, weakened bladders, where there is atony, the ureter, although widely dilated, has a very small vesical orifice. Moderate obstruction below to free urinary outflow, even painful vesical spasm, is believed to be capable of leading to dilatation of the ureters, and of causing the renal changes incident thereto, changes which make the kidney resemble a senile organ, and prepare it fully for microbic invasion.

A difference, however, is here. In the senile organ, partly atrophied and partly sclerosed as it is, there is an abasement of function. A number of observers agree upon this point. I may cite notably the thesis of Pierre Roche, who concludes that in the aged the quantity of urine is reduced one-sixth, the phosphoric acid is diminished by two-thirds, urea by one-half, chlorides unaltered, density about normal.[1]

Such abased function is not found in the kidney damaged by gradual chronic overdistention. Here there is an irritative element. Polyuria, very active polyuria, worse at night, is the rule. Ultzmann makes polyuria a constant sign of chronic pyelitis; and Oppolzer has even gone so far as to say that many cases of diabetes insipidus are only instances of chronic pyelitis unrecognized.

I personally look upon this sign, polyuria, in an old man, with ever-increasing respect. An individual with this symptom markedly present I consider the worst of all possible risks in case of operation. I greatly prefer to operate upon the bladder of a man having intense suppurative pyelitis on both sides, whose urine is full of casts and loaded with albumin, and I expect him to get well after a serious operation with much more hope than I do a patient having clean, light, thin urine, containing no albumin, or only a trace, and either no casts or only an occasional hyaline one, but who presents this symptom, polyuria, to a marked extent.

Cases therefore suffering from the results of slow prolonged obstruction below, and with dilated ureters, be their condition due to stricture, prostatic disease, stone, or old age, are subjects ripe for suppurative infection of the kidney, brought on either spontaneously by a mounting upward of the microbic infective agent from below in the natural course of progressive suppurative disease unrelieved by treatment, or by an implantation of the seed through the instrumentality of the surgeon.

For although the dilatation of the ureter takes place from above downward, yet after it has occurred, micro-organisms introduced into

[1] Roche, following Bouchard, puts the daily average secretion of urine in old age at 1350 grammes, Rayer at 1824 c.c., Becquerel at 1267, Vogel between 1400 and 1600, Gubler between 1200 and 1500, Hepp at 1500. Beigel at 1320, Ballet from nineteen observations (150 tests) at between 500 and 800 grammes, his patients being from 70 to 86 years old. Therefore, polyuria is not a natural condition in old age. Its existence means disease. Albumin is not a normal ingredient of the urine of old age.

the bladder, and even particles of inert solid matter so introduced, shortly find their way upward, and may be recovered in the pelvis of the kidney, as has been demonstrated at the hands of several investigators. Inorganic matter, such as coal-dust, mounts slowly; organic matter (micro-organisms) rapidly.

The deductions to be drawn from this brief summary of facts are roughly:

1. To use reasonable care in exploring a healthy bladder or passing any instrument into it.

2. To use greater care if there be traumatism from stone, tumor, stricture, especially if the powers of the individual be weakened by age or disease.

3. To exercise every known precaution in exploring and manipulating, instrumentally, cases of dilated bladder in a fibrotic state, with enlarged ureters and damaged kidneys.

Part II.—Practical Application of this Résumé.

I now reach the practical question: *How* shall the kidney be guarded?—for prophylaxis is more than cure—a kidney once in positive *chronic* suppuration does not get well. Acute suppurative cases very often die; less active ones suppurate indefinitely, and, eventually kill, by the process of urinary cachexia, so-called, in most instances.

The ends to be kept in view are (1) to avoid all unnecessary traumatic violence, and (2) to maintain asepsis, particularly, when the urine is clear, and more especially so when there is a weak bladder, residual urine, and dilated ureters.

When the bladder and kidney are already in chronic suppuration the indication is to attempt to destroy micro-organisms by direct antiseptic applications below, and to sterilize the urine by medicines from above. This means an attempt at asepsis in instrumentation, antisepsis in topical and in internal medical treatment.

Although these ends may be aimed at, none of them can be absolutely reached clinically;[1] for let instrumental asepsis be carried even to perfection, yet the pendulous urethra harbors a multitude of germs, some of them pathogenic; and this anterior urethra cannot by any known process be absolutely clarified; therefore, be the instrument ever so clean, it may push some noxious germ before it into the bladder, where finding proper pabulum, it may multiply to the patient's discomfort; in

[1] Nor are all persons equally susceptible, moderate interference producing chill in one, when another, apparently in a more receptive condition, escapes entirely. Thomson, a medical missionary, states that among the Chinese urethral fever is unknown. Stricture and vesical calculus, he thinks, are more common in the province of Kwang-Tung than anywhere in the world, and in the hospital sounding and catheterism are practised daily, yet, he says, "In not one single case have I observed the fever that is so frequently concomitant to similar operations in Great Britain." He ascribes this to Chinese phlegmatic temperament, and apparently uses no preventive precautions.

this way the victim being, as it were, "hoist by his own petard." Fortunately, the surgeon can kill this germ, and often Nature can dispose of anything short of massive infection.

On the other hand, it is absolutely impossible to disinfect a bladder in chronic suppuration by any antiseptic irrigation, since many of the micro-organisms lie concealed, imbedded in the cells, protected from the action of the antiseptic lotion. Finally, medicines acting through the stomach do not effectively destroy micro-organism in the kidney—although they help in the main issue.

But shall we on account of these rebuffs fold our hands placidly and let Nature struggle unaided? By no means. Indeed, we can do very much, in a helping way, as daily experience attests. With modern methods it is nearly possible to do away with urethral and urinary fever. An old prostatic with thin bladder, clear urine, atony, dilated ureter, and damaged kidney, may be so handled as to escape catheter fever entirely, and to emerge into catheter life with sparkling urine and no pyelitis.

How shall this end be attained? The complicated methods of asepsis which have been advocated cannot endure; they must be made simple to become generally adopted. Machines for forcing sulphurous acid fumes or steam through catheters are well enough for specialists and special occasions, but they cannot be broadly applied. Boiling water (or dry heat for solid instruments), bichloride of mercury or nitrate of silver, 1 in 1000, are all that is required. Woven instruments should be discarded as far as possible on account of the difficulty of keeping them clean. All instruments after use should be subjected to boiling water, hollow instruments injected with alcohol before use and soaked for an hour in bichloride or twenty minutes in nitrate of silver solution.

But it is not essential, except on special occasions, to use all these precautions. For an operation or a first exploration in an aseptic case they are essential. It is all-important always to avoid traumatic violence as far as possible. This factor, according to my experience, is more important than very high class asepsis. Moreover, in the young and healthy, simple cleanliness may suffice; in the old and feeble asepsis and antisepsis are essential. Then, again, in the great majority of those in whose behalf instrumentation is called for, chronic suppuration already exists, and it is hardly logical to strain at attempts to avoid befouling a pool which is already defiled. Therefore, simple but perfect cleanliness (hot water) and the avoidance of traumatism are enough in most instances, except when an operation is to be performed, an exploration to be made, or catheter-life started upon a patient whose residual urine is clear. Here rigid asepsis and antisepsis are desirable. I have no respect for that minute detail sometimes advocated which counsels a bichloride towel and disinfection of the meatus for every simple passage of the

sound, and strives to render an old man's catheter life still more intolerable by forcing him to sterilize a number of catheters, to keep them in glass tubes stopped with cotton, and to disinfect his meatus at every instrumentation. Few old men will or can continue to do this, nor is it necessary.

I see no advantage in sterilizing or borating vaseline or glycerin. I had cultivated some vaseline taken from a pot in use for twenty years. This pot had never been disinfected or sterilized or its contents medicated in any way. It had been wiped out when empty, refilled from a supply can, and kept generally covered. I had some glycerin similarly cultivated. It was taken from a bottle never sterilized or medicated in any way, and in use for many years for catheter, cystoscope, and endoscope. These specimens yielded on cultivation only some ordinary air species of germs—nothing pathogenic.

The method of instituting catheter life which yields me all the satisfaction I require is the following: A rubber catheter is kept constantly in a 1 in 4000 bichloride solution and washed in very hot water after each use. Simple glycerin is the lubricant. The anterior urethra is to be flushed as the catheter enters for the first time, and all the way in through the membranous and prostatic urethra, with a 1 in 4000 bichloride solution. The urine is to be entirely but *very slowly* drawn off (watching the pulse), the patient being recumbent. The bladder is then to be immediately washed out with a 1 in 1500 (sometimes 1 in 2000, if the stronger causes too much pain) nitrate of silver solution, which usually occasions moderate temporary tenesmus. The bladder may then be washed out with a 6 per cent. salt solution (heaping tablespoonful to the quart), this to be drawn off, and such quantity of a weaker salt solution (teaspoonful to the quart) introduced and left in as the surgeon may think best.

The clean catheter, taken out of its bichloride solution and rinsed in hot water, and the salt solution, are to be used as often as any catheter is called for—further urethral flushing being a matter of personal judgment—the nitrate of silver repeated every one, two, or three days.

With such simple precautions catheter life may be safely instituted without implicating the kidneys, and often (unless the bar at the vesical neck bleed from being bruised) with (practically) an absence of pus in the urine, and this goes on until the tissues become hardened, when a non-disinfected catheter may be safely used, if simply kept clean.

When an operation is to be performed the urine is usually already purulent. In this instance it is better, and it has become almost a routine matter with me, to flush out the entire urethra and bladder before the operation with a salicylic acid solution followed by a 1 in 3000 or 4000 bichloride solution (this after the anæsthetic has been administered), and to follow the operation by a flushing out with a

nitrate of silver solution, 1 in 1000; finally, and in subsequent washings for cleanliness, using about a 6 per cent. solution of common salt in hot water, and such strengths of mercuric or argentic irrigation as seem called for.

I have discarded Thiersch's solution and boric acid for the same reason, difficulty of prompt preparation. If the Thiersch solution be made on the spot (salicylic acid, ʒss; boric acid, ʒiiiss, in powder, added to a quart of hot water, is near enough to the formula) it dissolves slowly. If the cold solution has to be heated it is troublesome. Boric acid also dissolves slowly, and the bacteriological experiments soon to be detailed show that it is no more effective in killing germs than is salt and water. Now salt dissolves at once, and it is more cleansing than simple water, therefore I use it; and salicylic acid besides being an admirable germ-killer, as the bacteriological tables will show, has the extra advantage, first pointed out by Bryson, of St. Louis, of penetrating further and cutting deeper into the thick cohesive muco-pus of chronic catarrhal inflammation than any other substance. Therefore I have had made a solution of salicylic acid in alcohol, eight grains to the ounce. The bacteriological tables show that one-half grain salicylic acid to the ounce is as effective a germ-killer as Thiersch's solution, consequently, by adding one ounce of my alcoholic salicylic acid solution to a pint of hot water, I have a mixture promptly made and as effective as that of Thiersch.

These are the solutions, and this the routine method upon which I rely for avoiding kidney complications when surgical interference upon the bladder is called for.

Medicines to affect the urine and the flushing of the kidney by diluent waters—adjuvants of no mean value in keeping down kidney complications and moderating them when they exist in a chronic form—I shall speak of after I have detailed the result of the bacteriological work, which forms an essential part of this study.

Part III.—The Bacteriological Study.

In order to investigate the bacteriological side of this question of kidney and bladder infection, with consequent suppuration, and to see what confirmation or dissent would be furnished to the conclusions which clinical observation justified, I determined to institute a rather extensive series of experiments, and obtained the co-operation of Dr. E. K. Dunham, Professor of Histology, Bacteriology, and Hygiene in Bellevue Hospital Medical College, a gentleman whose position insured his disinterestedness and capacity. I selected nearly all the substances I was accustomed to use either for local application or through the stomach, and asked him to determine their relative destructive power, if any, upon pure cultures of staphylococcus pyogenes aureus, of streptococcus pyo-

genes, and of bacterium coli commune. I incorporate his tables and his remarks as to the process employed.

The substances chosen to be experimented with[1] are the following:

1. 1 in 1000 mercuric bichloride.
2. 1 in 2000 " "
3. 1 in 3000 " "
4. 1 in 4000 " "
5. 1 in 5000 " "
6. 1 in 10,000 " "
7. 1 in 500 argentic nitrate.
8. 1 in 1000 " "
9. 1 in 2000 " "
10. 4 per cent. solution of boric acid.
11. 10 per cent. solution of common salt.
12. 20 " " " "
13. 30 " " " "
14. Thiersch's solution.
15. Acid salicylic, gr. ss; alcohol, ʒss; water, ʒj.
16. Marchand's peroxide of hydrogen, 1; water, 3.

All these were to be tested for various lengths of time. Vaseline also was furnished from a pot not prepared, not disinfected in any way, and in common use for many years, and common glycerin from a bottle which had been in use for many years.

I supplied also many medicated urines. I selected two individuals in apparent good health whose conduct I could control. They took the same medicine at the same time, and at intervals of about four days specimens marked A, B, A1, B1, etc., were sent to the laboratory for investigation, Dr. Dunham being at the time ignorant of the kind of medicine that was being experimented with.

I was guided as to my interval of time between the tests by observing that the greenish-blue color imparted by methylene-blue to the urine, being most dense about eight hours after the drug was swallowed, practically disappeared during the fourth day, although faintly visible upon the fifth—an overlapping that could not be important. About five thousand examinations in all were made.

Report on a Series of Experiments to Determine the Value of Certain Solutions as Germicides, made for Dr. E. L. Keyes in October and November, 1893, by Edward K. Dunham.

The solutions experimented with were, first, solutions of chemical substances made of definite strength, distilled water being used as a solvent; second, samples of urine from healthy individuals after the exhibition of certain drugs.

[1] I did not test potassium permanganate or carbolic acid, as I very rarely use them.

The bacteria used to test the germicidal value of these solutions were: Staphylococcus pyogenes aureus, streptococcus pyogenes, and bacterium coli commune. The cultures used were either vigorous cultures in bouillon grown in the incubator at a temperature of about 36° C. about twenty hours, or a similar culture upon agar-agar, cultivated at the same temperature for the same length of time.

The experiments made can be divided into two groups, which were designed in one group to favor the action of the substances in solution by bringing them into the most intimate contact with the bacteria experimented on; while in the other group of experiments an attempt was made to favor the bacteria by necessitating the penetration of the solution through a thin layer of bacterial growth before contact with all the bacteria could be effected. The details of the procedure were as follows:

GROUP I. Five cubic centimetres of the solution, or urine, were introduced into a sterile test-tube by means of a sterilized pipette. One drop of the twenty-hour bouillon culture of the bacterium was then introduced and the mixture well shaken. One loop (*circa* one drop) of the mixture was then removed after a definite interval of time, and either introduced into a tube of melted gelatin which, after mixing its contents, was placed in a horizontal position until the gelatin had solidified, or the loop of the mixture of solution and bouillon culture was distributed over the surface of agar-agar solidified obliquely in a test-tube. The growth which took place in the gelatin or agar tubes was then observed and recorded.

GROUP II. A series of test-tubes in which agar had been solidified obliquely were inoculated with the bacteria to be experimented upon, and placed in the incubator for about twenty hours. Into these tubes enough of the solution or urine to be tested to completely cover the growth of bacteria was poured. After a given length of time the solution or urine was poured off, the layer of growth washed with about ten cubic centimetres of sterile bouillon, and then either a gelatin tube or an agar tube inoculated with some of the growth remaining in the tube. On successive days the original agar tubes, the bouillon with which they were washed out, and the gelatin or agar tubes inoculated from them, after the washiug with bouillon were all examined for evidence of growth and amount of growth, and the results recorded.

The urine received for use in these experiments was not free from living bacteria. It, therefore, was necessary to make sure in each case that the growth of the various culture tests were of the species intentionally experimented upon. In the case of the staphylococcus pyogenes aureus a simple inspection of the growth upon agar was deemed sufficient to decide this point. In the case of the streptococcus the growth was examined in hanging drops, and if the coccus chains containing the individual cocci of the proper dimensions were observed a positive result was recorded. As a matter of fact, the growth when present was in nearly all cases sufficiently typical to leave no room for doubt as to the identity of the species. To test for the presence of living bacterium coli commune, gelatin cultures were chosen, and if white non-liquefying colonies of proper size, accompanied by gas production developed, the result was recorded as positive.

Some of the mixtures were allowed to stand for the specified time at the temperature of the room, which varied from 65° F. (16° C.) to 72° F. (22° C..)

Experiments with Chemical Solutions and Medicated Urines.

o no growth.
x slight growth.
xx moderate growth.
xxx considerable growth.
xxxx vigorous growth.
† Test defective.

Solution used.	Bacterium.	Group I. Time of exposure, and result.				Group II. Time of exposure, and result.			
		2 min.	10 min	1 hr.	24 hrs.	2 min.	10 min	1 hr.	24 hrs.
Mercuric chloride, 1 in 1000	Sta. p. a.	o	o	o	o	x	x	o	o
	Strep.	o	o	o	o	o	o	o	o
	Coll.	o	o	o	o	o	o	o	o
1 in 2000	Sta. p. a.	x	x	o	o	x	x	x	o
	Strep.	x	o	o	o	o	o	o	o
	Coll.	o	o	o	o	xxxx	xxxx	x	†
1 in 3000	Sta. p. a.	xx	x	†	o	x	x	x	o
	Strep.	o	o	o	o	o	o	o	o
	Coll.	x	x	o	o	†	xxxx	xxxx	†
1 in 4000	Sta. p. a.	o	o	o	o	xxxx	xxxx	xxxx	†
	Strep.	o	o	o	o	†	†	†	o
	Coll.	o	o	o	o	†	†	†	†
1 in 5000	Sta. p. a.	x	x	x	o	xxxx	xxxx	xxxx	†
	Strep.	†	†	o	o	o	o	o	o
	Coll.	x	x	x	o	xxxx	xxxx	xxx	†
1 in 10000	Sta. p. a.	xxxx	xxx	xx	o	xxxx	xxxx	xxxx	xxx
	Strep.	o	o	o	o	xxxx	xx	xx	x
	Coll.	o	o	o	o	xxxx	xxxx	xxx	xx
Argentic nitrate, 1 in 500	Sta. p. a.	o	o	o	o	xxxx	xxxx	xxxx	†
	Strep.	o	o	o	o	†	†	†	o
	Coll.	o	o	o	o	xxxx	xxxx	xxxx	†
1 in 1000	Sta. p. a.	o	o	o	o	xxxx	xxxx	xxxx	†
	Strep.	o	†	o	o	xxxx	xxxx	xxxx	†
	Coll.	o	o	o	o	xxxx	xxxx	xxxx	†
1 in 2000	Sta. p. a.	o	o	o	o	xxxx	xxxx	xxxx	xxx
	Strep.	o	o	o	o	xxx	xxx	xxx	o
	Coll.	o	o	o	o	xxxx	xxx	xxx	xx
		1 min.	2 min.						
Mercuric chloride, 1 in 4000 at 98° F.	Sta. p. a.	x	x						
	Strep.	o	o						
	Coll.	x	o						
Argentic nitrate, 1 in 1000 at 98° F.	Sta. p. a.	o	o						
	Strep.	o	o						
	Coll.	o	o						
		2 min.	10 min						
Boric acid, 4 per cent.	Sta. p. a.	xxxx	xxxx	xxxx	xx	xxxx	xxxx	xxxx	†
	Strep.	xxxx	†	o	o	xxxx	xxxx	xxxx	†
	Coll.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	†
Sodium chloride, 10 per cent.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	†
	Strep.	xxxx	x	o	o	xxxx	xxxx	xxxx	†
	Coll.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	†
20 per cent.	Sta. p. a.	xxxx	xxxx	xxxx	†	xxxx	xxxx	xxxx	†
	Strep.	xxxx	xxxx	o	o	xxxx	xxxx	xxxx	†
	Coll.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	†
30 per cent.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	†
	Strep.	xxxx	xxxx	o	xxxx	xxxx	xxxx	xxxx	†
	Coll.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	†
Thiersch's solution,	Sta. p. a.	x	o	o	o	xxxx	xxxx	xxxx	†
	Strep.	o	o	o	o	xxxx	xxxx	xxxx	†
	Coll.	o	o	o	o	xxxx	xxxx	xxxx	†

Solution used.	Bacterium.	Group I. Time of exposure, and result.				Group II. Time of exposure, and result.			
		2 min.	10 min	1 hr.	24 hrs.	2 min.	10 min	1 hr.	24 hrs.
Salicylic acid, ½ gr. in 1 oz.	Sta. p. a.	o	o	o	o	xxxx	xxxx	xxxx	†
	Strep.	o	o	o	o	xxxx	xxxx	xxxx	†
	Coli.	o	o	o	o	xxxx	xxxx	xxxx	†
Marchand's peroxide of hydrogen, 25 per cent.	Sta. p. a.	x	o	o	o	xxxx	xxxx	xxxx	†
	Strep.	o	o	o	o	xxxx	xxxx	xxxx	†
	Coli.	x	o	o	o	xxxx	xxxx	xxxx	†
Unmedicated urine, A[1]	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	†	†	†	†	†	†	†	†
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.I. 6 grs. methylene blue in 8 hours = 18 grs. in 24 hrs.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	†	†	†	†	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.II. 30 grs. salol in 8 hours = 90 grs. in 24 hours	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.III. 30 grs. boric acid in 8 hours = 90 grs. in 24 hrs.	Sta p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.IV. 30 m. wintergreen oil in 8 hrs. = 90 m. in 24 hrs.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.V. 12 grs. saccharine in 8 hours = 36 in 24 hours.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	x	xxxx	xxxx	xxxx	xxxx
B.V. Same as above	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.VI. 15 grs. benzoate of soda in 8 hrs. = 45 grs. in 24 hrs.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	o	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xx	xxxx	xxxx	xxxx	xxxx
B.VI. Same as above	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	x	†	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.VII. 50 m. oil of eucalyptus in 8 hrs. = 150 in 24 hrs.	Sta. p. a	xxxx	xxxx	xxxx	†	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	†	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	x	†	xxxx	xxxx	xxxx	xxxx
B.VII. Same as above	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	o	†	xxxx	xxxx	xxxx	xxxx
A.VIII. 20 m. sandal wood oil in 8 hrs. = 60 m. in 24 hrs.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	†	†	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
B VIII. Same as above	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	o	†	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx

Observations on Samples of Glycerin and Vaseline.

One cubic centimetre introduced into gelatin yielded in one case a single colony of bacteria of a common air species, in another case two colonies. It seems most likely that these gained access to the gelatin during the manipulations necessary to prepare the mixture. The cultures were kept under observation for ten days.

[1] A only tabulated unless B differs in result.

Agar tubes were inoculated with small quantities of vaseline and placed in the incubator at 36° C. for several days. No growth resulted.

It appears, therefore, that the glycerin and vaseline were probably free from viable bacteria.

It will be noticed that in these numerous experiments clinical conditions have been imitated. In Group I. recent infection is simulated—*i. e.*, inoculation, the germ having been carried in by an instrument and lying free in the bladder, exposed to the most advantageous attack by the antiseptic. In Group II. the tissue involved in chronic inflammation is imitated, one layer of germs protects another. In actual life the tissue elements and tenacious mucus form a much better protective cover for the germs than could be well imitated in the laboratory. And it turns out scientifically, as it is proved to be practically, that the same reagent perfectly effective in Group I. is practically inert against the same germs in Group II.

This explains why by local treatment alone we may from the first avoid producing local suppuration, yet we cannot arrest local suppuration once started except by long-repeated effort, sometimes not at all. A glance at the first table also shows that while argentic nitrate is much more reliable than anything else in Group I.—bichloride is more reliable in Group II.—as might *a priori* have been inferred. The argentic nitrate coagulates the surface and protects the deeper germs, the bichloride solution has more penetrating power, and is, therefore, the more reliable the deeper the germ is situated.

The tables show mercuric bichloride up to 1 : 4000 to be absolutely effective (apparent deviations being doubtless due to errors of method and contamination) in Group I., while nothing less than 1 : 1000 can be depended upon in Group II., where the micro-organism has half a chance, and buried among the cells of a chronically inflamed mucous membrane the micro-organism surely has much more than half a chance.

Argentic nitrate up to 1 : 2000 is fully effective in Group I., entirely unreliable in Group II. In a comparative test nitrate of silver 1 : 1000 is better than mercuric bichloride 1 : 4000.

Boric acid is worthless in both groups, and so is salt up to a 30 per cent. solution.

Salicylic acid one-half grain to the ounce, Thiersch's solution, Marchand's solution, 1 part to 3 of water, are all reliable in Group I., useless in Group II.

Some recent experiments by Ali Krogius and Sam Chedenius go to show that the staphylococcus resists mercurial preparations longer than streptococcus or coli commune; the latter resists nitrate of silver the longest, streptococcus the least of the three.

The medicated urines were experimented with as follows:

Two apparently healthy persons having clear urine took the same drug

at the same hours on a given day. The next morning each urinated into a bottle without precautions, and the specimens marked A, B, etc., were sent for examination. They also were tested with the micro-organisms in Groups I. and II., just as the medical solutions had been tested. The substances used, with the doses taken and the hours were as follows:

A and B. Unmedicated urines.
A. I. and B. I. 2 grains methylene-blue at 2, 6, and 10 P.M., equivalent to 12 grains a day.
A. II. and B. II. 10 grains salol at 2, 6, and 10 P.M. (ʒj in twenty-four hours).
A. III. and B. III. 10 grains boric acid at 2, 6, and 10 P.M. (ʒj in twenty-four hours).
A. IV. and B. IV. 10 minims wintergreen oil at 2, 6, and 10 P.M. (ʒj in twenty-four hours).
A. V. and B. V. 4 grains saccharine at 2, 6, and 10 P.M. (24 grains in twenty-four hours).
A. VI. and B. VI. 5 grains benzoate of soda at 2, 6, and 10 P.M. (ʒss in twenty-four hours).
A. VII. and B. VII. 10 minims Sanders' oil of eucalyptus at 2, 4, 6, 8, and 10 P.M. (Lydston), 100 minims in twenty-four hours.
A. VIII. and B. VIII. 10 minims sandal-wood oil at 6 and 10 P.M. (40 minims in twenty-four hours).

These substances were selected because they all, except perhaps the saccharine and the oil of eucalyptus, about which I am ignorant as yet, have undoubtedly a positive influence in moderating suppuration in chronic cases of kidney and bladder disease if properly selected, yet none of them cure, unless, perhaps, when persistently used in moderate cases. In profound chronic disorder they are next to valueless.

As was to have been expected, therefore, these substances do not exhibit in the laboratory any influence upon the growth of micro-organisms inoculated upon them and properly cultivated. The germ grows just as rapidly as in the urine of the same individuals not medicated when treated in the same way. Group I. and Group II. are alike negative. There is a faint show of beneficial influence (as to Group I.) in the urines medicated by benzoate of soda, by oil of eucalyptus, and by sandal-wood, but it is very slight. I did not test naphthaline, extolled by Couremenos, as the dose required is impossible in most kidney cases.

A further set of experiments, too elaborate for detail here, were made by Dr. Dunham with ½ per cent., 1 per cent., and 2 per cent. solutions of phenol-sulphate of potassium—the salt which appears in the urine when salol is taken by the mouth. The result demonstrated clearly that while even a 2 per cent. solution did not kill those pathogenic bacteria which are the subjects of this study, yet even a ½ per cent. solution showed a marked, though not very great inhibitive, action on their growth.

I cannot terminate this study without here laying emphatic stress

upon, and calling especial attention to, the value of abundantly flushing the urinary passages with bland mineral waters of the diluent variety, as a means of flooding out both pus cells and micro-organisms mechanically in many forms of chronic suppurative disease all along the urinary tract.

I know of no one single agent that possesses so much power for good. The enemy is decimated by this method of warfare and can be taken at a disadvantage. I refrain from speaking the names of the mineral springs that possess this power—and there are many of them—because the commercial spirit of to-day prostitutes such utterances.

The character of the mineral ingredient in the spring is not material. All that is required is that one may be able to stomach the water freely—to drink a gallon, two gallons a day, or more, and that the water shall not affect the bowels.

A number of such waters exist. Distilled water does not do the work, nor does rain-water. Ordinary clear spring-water fails. In selecting a mineral water it is only necessary to find a cheap one that may be consumed in vast abundance without a feeling of repletion—one that will pass rapidly through the kidney, having no influence upon the individual other than the diuretic one.

And in closing, I wish further to emphasize two prognostic points: one is the common error of believing that the presence of pus in the urine is capable of accounting for a considerable amount of albumin. One constantly hears this expression: "Albumin in the urine accounted for by the pus." Surely this is true of a trace of albumin—but only of a trace. An admixture of blood with the pus, or of blood-serum coming from an excoriated tumor in the bladder, or from an ulcer; this will account for albumin in quantity; but when there is no tumor, no stone, no ulcer in the bladder, there may be very considerable amounts of pus with barely a trace of albumin, and if under such physical conditions the amount of albumin be relatively large, it usually means pyelitis—implication of the kidney in interstitial or parenchymatous change, and by so much becomes a factor of importance in prognosis. Anything over $\frac{1}{2}$ of 1 per cent. by *weight* of albumin in urine, however purulent—if there be no blood in the specimen, no tumor, no stone, no ulcer in the bladder—becomes a factor in the question of prognosis when the point of the expediency of an operation comes to be considered. These cases may be assumed to have already reached a degenerative stage, and the chances of lighting up surgical kidney by operative interference below are relatively great.

The prognosis is, however, not worse—not so bad—as it is in the case of sclerotic kidney, with dilated ureter, etc., those cases in which there is active polyuria, worse at night, clear or nearly clear urine, with only a faint trace of albumin, or none at all. Such patients, after operation,

are apt to die intensely uræmic, passing quarts of urine, and sometimes with little or no fever.

I may briefly summarize my conclusions as follows:

1. Healthy urine is sterile.

2. Purulent urine is always microbic.

3. Microbic infection takes place from within the body by a number of methods in the course of disease; it is often brought about by instrumental manœuvres on the part of the surgeon.

4. A healthy organism and vigorous bladder may cope successfully with microbic invasion, and rid itself spontaneously, or with a little aid, of all damage arising therefrom—showing little or even no inflammatory response.

5. A suitable condition of the patient's soil is essential to the propagation and perpetuation of inflammatory phenomena upon the urinary tract—after microbic invasion.

6. This condition, intensified, by traumatism and physical weakness, notably of the degenerative variety, is most intense when there is vesical distention with atony, and when the ureters are dilated and the kidneys involved in the changes incident to tension below—namely, atrophy and sclerosis above, with or without surface catarrh.

7. Under these circumstances surgical pyelonephritis is most likely to declare itself as a result of microbic infection from below (occasionally from above)—in the course of suppurative disease or after operative interference.

8. Asepsis, antisepsis, and sterilization of urine are ends to be aimed at in genito-urinary surgery—but, like all other greatest goods, not yet attained in perfection. Much, however, can be done by local means in a prophylactic and curative way, little by internal medication, and possibly as much or more than by any other means by flushing the urinary passages with natural mineral waters.

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GASTRO-ENTERIC RHEUMATISM.[1]

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In his interesting description of nervous dyspepsia marked by an excess of hydrochloric acid in the gastric juice, Mathieu seems inclined (*Traité de Médecine*, vol. iii. p. 270) to ascribe the gastralgic and neuralgic pains of the disease to a local action of the excessive secretion upon the walls of the stomach. He recognizes the intimate relation

[1] Read before the Association of American Physicians, Washington, June 1, 1894.

between this morbid condition and neurotic and arthritic states of the body, but he does not sufficiently emphasize the fact that in many, if not in all such cases, we have to deal with a distinct and definite form of rheumatism that merits recognition and designation as rheumatic dyspepsia. This is just as much a local disorder of the nervous and glandular apparatus of the alimentary canal as rheumatic tonsillitis is a definitely localized manifestation of arthritic disease in the fauces, or as podagra is a local exhibition of gout in the feet. It is, accordingly, among members of the arthritic class of patients that this form of gastralgia and dyspepsia is encountered. It is in advanced life or among prematurely aged and exhausted subjects that this species of rheumatism is most commonly observed. Some of the worst cases occur among middle-aged ecclesiastics and other sedentary people with slender muscles, but with plenty of time and zeal for copulation, which for such persons constitutes the type of neuro-muscular excess. Some of these patients have suffered in earlier life with inflammatory rheumatism; some have had genuine articular gout; sometimes a tendency to obesity is evident; diabetes and polyuria occasionally appear. Premature whitening of the hair, early baldness, erythema, pityriasis, eczema, hemicrania, neuralgia, asthma, chronic bronchitis, lithiasis, various functional disorders of the kidneys, and varicosity of the hemorrhoidal, scrotal, and peripheral veins are of not infrequent occurrence. Sometimes the same patient exhibits a group of these diseases at once, or he experiences them singly and successively. Sometimes they are distributed among different members of the same family, so that while one is obese another will be diabetic, a third rheumatic, a fourth hemorrhoidal, and so on. But, with advancing years, the tendency to vague, wandering, neuromuscular manifestations of the diathetic vice becomes more pronounced and inveterate. The grave disturbance of comfort that is thus produced, and the intolerable mental anxiety that may be caused by failure to recognize the true character of the disorder, give to rheumatic dyspepsia an importance greater than is usually assigned to it in the ordinary textbooks and treatises on medicine. Thus, Eichhorst, in his description of diabetes, gives a summary of the symptoms of gastro-enteric rheumatism as sometimes present in the course of the glycosuric disease, but he does not seem to recognize its independent character as a concurrent manifestation of arthritism, and he enumerates its symptoms as a part only of the symptomatology of diabetes. I desire, therefore, to call attention to this particular form of rheumatism affecting the nerves of the alimentary canal, because it is the cause of a great amount of misinterpreted and, consequently, unrelieved suffering. Its painful paroxysms are experienced when the stomach is nearly or quite empty, several hours after taking food. They are therefore suffered toward noon or in the latter part of the afternoon, or during the night—usually after mid-

night, though sometimes as early as ten o'clock in the evening, or as late as five o'clock in the morning.

The location of the pain is generally abdominal, usually occupying the epigastrium or the hypochondrium. It is not limited to a single focus, but seems to occupy a considerable territory as if by diffusion; or, to compare spatial sensations with visible objects, as if it were an ill-defined nebula instead of a luminous star. Sometimes pain is felt in the cardiac region; occasionally it is more evident in the muscles of the upper arms than in the trunk.

The character of the pain is very peculiar, and is of a nature that distinguishes it from other abdominal pains. It may be accompanied by tenderness of the epigastric region, particularly in the sternal third of the right rectus muscle; but such tenderness is distinct from the paroxysmal pain of gastralgia. Gastric pain is not increased by pressure or by movement. The patient may cough, sneeze, laugh, walk, or run without in any appreciable manner influencing the location or the character or the severity of the pain. Its intensity is not usually very great, though it may be sometimes horribly severe and attended with a feeling of fearful exhaustion. It is a dull, deep-seated, widely diffused, and persistent distress, quite different from the pain of ordinary gastralgia, hepatalgia, renal or intestinal colic, or peritonitis. It must not be confounded with the pains that occur in the gastric crises of tabes dorsalis or in chronic alcoholism, or in peripheral neuritis of any other kind. By the sufferer it is readily distinguished from pains that have their seat in the abdominal walls, and that sometimes occur in paroxysms which alternate with the paroxysms of gastro-enteralgia. In short, the pain of which I speak possesses all the characteristics of neuralgia affecting the ganglionic nervous system rather than the cerebro-spinal nerves of the body. Such pain, when severe, is more intolerable than ordinary peripheral neuralgia.

Rheumatic gastro-enteralgia exhibits a marked tendency to alternation with the neuralgias and myalgias that occur in other nerve territories. In this respect it conforms to the rule that governs the exhibition of vague, wandering, neuro-muscular rheumatism. The patient frequently complains of pain in the face and eyes, to-day; in the neck, throat, and shoulders, or in the heart, to-morrow; the abdominal viscera being next invaded. Sometimes the disturbance affects the cortex of the brain, causing insomnia instead of actual pain. When the gastric plexus of nerves becomes involved, the painful paroxysms are more regularly recurrent than in other parts of the body. In the corresponding enteric plexus it sometimes persists for a long period of time. Of this variety the dyspeptic and arthritic Samuel Pepys, of blessed memory, has left a graphic account in his immortal diary (September 27–October 13, 1663).

When the disturbance is thus shifted to the enteric plexus the distress

is usually less severe, but not less annoying, than when it invades the stomach alone. Sometimes the pelvic nerves are the seat of irritation, and the patient may suffer intensely with rectal or vesical agony. Sometimes the sexual organs participate in the general disorder, and the patient is harassed by prolonged and painful nocturnal erections. Like the analogous priapism sometimes experienced by gouty subjects, this condition soon yields to potassium iodide and to small blisters upon the perineum. In neurotic patients who are liable to pain as the concomitant of weather changes and barometric disturbances, it is not unusual to note an increased frequency of attacks during the damp and changeable weather of the spring and fall of the year. On such occasions, especially after severe fatigue, the gastric paroxysm is frequently accompanied by transient fulgurant pains like those of tabes dorsalis.

During the intervals between the paroxysms, especially if food and sleep have been procured, bodily comfort may be complete. But the close of gastric digestion, or the occurrence of bodily fatigue, or an exposure to cold damp air may be immediately followed by a return of pain. At first, the general health does not appear to be appreciably affected, but after a while loss of sleep, loss of appetite, and persistent mal-assimilation produce a condition of exhaustion. The patient becomes morbidly sensitive to cold; he is neurasthenic and quite incapable of mental or physical activity. Yet some of these sufferers present a florid appearance, and retain their usual weight. As a general rule, however, they gradually become anæmic and cachectic. Many of them are hypochondriacal; and some of the more intelligent class suffer severely through apprehension of malignant disease involving the stomach or other abdominal organs.

The diseases from which gastro-enteric rheumatism must be distinguished are:

Abdominal gout.
Rheumatism of the abdominal muscles.
Subacute peritonitis.
Chronic pancreatitis.
Chronic hepatitis.
Hepatic colic.
Renal colic.
Chronic catarrhal gastritis.
Ulcer of the stomach.
Carcinoma of the stomach and adjacent viscera.

From abdominal gout the disease may be distinguished by the history and habits of the patient.

From rheumatism of the abdominal muscles this disorder is differentiated by the absence of tenderness on movement or manipulation of the muscles. The concurrence of muscular tenderness with gastric pain

is not uncommon, and this renders the diagnosis more difficult under such circumstances. It then becomes necessary to note particularly the recurrent incidence of pain, and its association with an empty stomach.

From peritonitis a distinction is established by the absence of fever, tenderness, tympanites, and other symptoms of serous inflammation.

From chronic pancreatitis the disease may be distinguished by the situation and character of the pain, and by its recurrent coincidence with emptiness of the stomach.

The same thing is true of the difference between this gastric disorder and the various painful affections of the liver.

Biliary colic is irregularly recurrent, but it is frequently followed by jaundice and by fecal changes that are absent in gastro-enteric rheumatism. It, moreover, has no relation to the state of repletion of the stomach.

Analogous differences may be noted between the attacks of renal colic and the paroxysms of rheumatic gastralgia.

From the ordinary chronic catarrhal gastritis the disease differs in the greater severity and intermittence of the pain by which it is accompanied. Other symptoms of arthritism can be also discovered; and, if the intestines do not share in the disorder, the nutritive functions are but slightly disturbed.

From ulcer of the stomach the disease differs in the paroxysmal recurrence of pain that is not increased by pressure, or aggravated by taking food.

From carcinoma of the stomach it is differentiated by the absence of tumor; by the intermittent character of the pain; by the relief that is obtained on taking food; and by the overabundance of free hydrochloric acid in the gastric juice.

The pathology of the disease still remains as unsatisfactory as that of rheumatism in general. It seems probable that the symptoms are the result of toxic influences affecting the tissues as a consequence of hepatic and renal insufficiency. Just as in strictly gouty cases the agency of uric acid has been demonstrated, and as in uræmia certain definite symptoms exist, so it is more than probable that under certain conditions of retarded oxidation, toxic substances may be generated in the tissues, or taken up from the alimentary canal, and circulated with the fluids of the body to the painful detriment of the sensory apparatus of the nervous system. That the presence of these toxic substances is largely due to hepatic insufficiency is rendered probable by the good effects that follow the use of cholagogue stimulants and a proper regulation of the diet. Much better results generally follow a careful supervision of the alimentary canal and its appendages, than when the kidneys alone are addressed. Great relief from present suffering is obtained through free perspiration, but this measure is more palliative than curative.

Why the local manifestations of disorder are as varied and transient as they are, cannot be readily explained. It is probable that the different symptoms that are exhibited by different patients, and the variety of painful sensations that are experienced by the same individual, are due to differences in selective action and degree of saturation on the part of the toxines and the various tissues of the body. It is possible thus to explain the variations that intervene between trifling excitation and complete paralysis of sensation; but the intermittent and erratic character of the attacks is not so easily interpreted. When the seat of disturbance is in the muscular layer of the gastro-intestinal wall, the phenomena of cramp or of paralysis are most conspicuous. If the secretory nerves and the corresponding glands are excited, pyrosis, hyperchloridria, or diarrhœa may be experienced. If, as occasionally happens, the peritoneum be invaded, a most excruciating and dangerous form of peritonitis follows. But if the great network of ganglionic nerve fibres alone be involved, the symptoms of gastro-enteric nervous rheumatism are displayed.

The discovery that when this form of rheumatic pain affects the gastric plexus there is present an excess of free hydrochloric acid in the gastric juice, suggests the thought that here is a condition of the organ analogous to that of an over-taxed muscle that is painful after fatigue. We know that the disintegration of muscular tissue during work sets free an excess of sarcolactic acid in the muscle. So long as this is retained in the muscular tissue during the partial stagnation that may occur after the cessation of exertion, the muscular nerves are rendered uncomfortable, and the patient complains of a species of soreness in the affected part. But when the excreta of the muscle have been removed by rest, or by massage, or a warm bath, complete relief is experienced. If, however, under such circumstances there be exposure to wet and cold, especially if the patient be arthritically disposed, elimination is not accomplished, and a form of inflammatory departure from the normal standard of nutrition is set up. This, however, does not explain the periodically recurring sensations of pain that are experienced when the stomach is empty. It seems probable that they result from a condition of the gastric mucous membrane that retards the absorption of gastric juice at the close of digestion in the stomach, so that the excess of hydrochloric acid acts upon the nerves of the hollow gastric muscle, in a manner very like what is experienced in the locomotive muscles of the body when fatigue and stagnation follow a period of over-exertion and over-production of sarcolactic acid. It is also more than probable that in the conditions of retarded oxidation and faulty nutrition that characterize the arthritic diathesis, the gastric juice may contain other noxious agents beside an excess of hydrochloric acid.

The urology of these cases must be postponed for the present. Its

indications are exceedingly variable and very obscure. The chemistry of the urine in erratic rheumatism is yet to be written.

The treatment of gastro-enteric rheumatism does not differ from that of other varieties of neuro-muscular rheumatism. Like other cases of intense neuralgia, the severest cases of gastralgia and enteralgia require the palliative exhibition of opiates. But, fortunately, the ordinary, commonplace forms of the disease are more easily relieved. When the period of distress occurs three or four hours after the last meal, it may be promptly arrested, in many cases, by a crust of bread or a glass of milk, or a cup of hot water. The patient, however, must be cautioned against reliance upon such measures alone, for they sometimes aid in effecting dilatation of the stomach. I once saw a middle-aged man who had accidentally discovered the palliative quality of milk, and who, consequently, carried in his pocket a quart bottle of milk, from which he drank whenever he felt a pang of pain. This had resulted in an enormous dilatation of the stomach without cure of the disease. Slightly alkaline liquids, such as lime-water, etc., are useful. When the gastric juice contains an extraordinary quantity of hydrochloric acid, it may be necessary to give sodium bicarbonate in scruple doses, three or four times a day. Still better, because more curative, is the sodium salicylate, which should be given in ten-grain doses every three hours until the tissues are saturated with the drug. Salol may be used with advantage if the stomach objects to the salicylate. Both of these preparations are useful also by reason of their active cholagogic property.

Chief among the remedies that are both curative and palliative is olive oil. The patient should take half an ounce or an ounce of salad oil whenever the stomach is empty. This also relieves the constipation that is so commonly present; and by liquefying the bile renders its discharge more easy and certain. In cases of obstinate constipation, it is desirable to employ laxatives that stimulate the excretion of bile:

℞.—Podophyllin. . . . . gr. $\frac{1}{10}$.
Fel. bovin.
Euonymin. } . . . . . āā gr. j.
Ext. hyoscyam.
Sig.: Pil. tal. t. i. d. capiat.

The chronic character of the disease renders necessary a resort to alteratives in many instances. Small doses of mercury (hydrarg. biniodid., gr. $\frac{1}{100}$) three times a day; potassium iodide with colchicum:

℞.—Pot. iodid. . . . . ℥j.
Vin. colchici sem.
Aq. cinnam. } . . . . . āā ℥j.
Sig.: Gtt. x, t. i. d. capiat.

—together with tonic doses of quinine or of elixir calisayæ, must be administered for many successive months. Sometimes a course of nitric

acid, or of the ammoniated tincture of guaiac, is very beneficial. Occasional mercurial purges should not be neglected; and flushing the colon with hot water is often a means of great relief. The late Mr. Pepys extols the efficacy of large clysters composed of warm ale in which butter and sugar had been dissolved. It is probable that the popularity of hot toddy at bedtime has a similar foundation among old people.

Of great importance is the regulation of the diet. If the patient has been a full feeder, florid in complexion, and inclining to the gouty variety of arthritism, he should be placed for a time on vegetable food, with little or no meat. Mineral waters, of the Vichy and the Carlsbad type, will be found useful in such cases. But this regimen must not be carried too far. Insufficient alimentation will surely aggravate the paroxysmal attacks. One of my clients, who frequented a notorious downtown lunch counter, used to claim that for a fifteen-cent meal at noon he could be sure of gastralgia at five o'clock, while for twenty cents he could purchase perfect immunity during the whole day. Elderly patients who are thin and neurotic often get help from small quantities of brandy or whiskey after meals; but this remedy must not be taken habitually, for in the long run arthritic subjects are very intolerant of alcohol. Debilitated patients who are easily exhausted, and who crave food at short intervals, should have a nitrogenous diet, with very little saccharine and starchy food. Such patients can sometimes eat a hearty dinner, with pickles, cheese, and nuts, without discomfort; but the experiment should not be often repeated. When fats disagree, causing acid eructation, etc., they should be eliminated from the dietary; but when they are digested, they exercise a beneficial influence. It is probable that the good effects of cod-liver oil in many cases of chronic rheumatism may be thus explained.

Frequent warm baths are exceedingly grateful—hence the benefit derived from the various hot springs by people who will not bathe at home. The best result from bathing is obtained from its association with massage. The patient should rise early, take a very light breakfast, then enter the bath, and be thoroughly soaked and manipulated at a temperature of 90° to 95° F. Another light meal may then be eaten, and the patient should remain in bed until noon, the latter part of the day being devoted to exercise in the open air and to general recreation. Alcohol, tobacco, tea and coffee must be forbidden, for they are not compatible with arthritism, because they retard those processes of oxidation that need acceleration in every possible way. Great fatigue of mind and body must also be avoided, for there is a notable connection between fatigue and every explosion of rheumatic pain.

THE MANAGEMENT OF FEVERS, AND PARTICULARLY OF TYPHOID OR ENTERIC FEVER.

By J. Burney Yeo, M.D., F.R.C.P.,
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Scientific and rational medicine requires that our therapeutic ideas should be in accord and on a level with our pathological knowledge.

It is already a considerable thing that our minds should be possessed with a correct idea of the indications to be fulfilled in the management of any particular disease, even should the means of giving effect to the idea not yet be at our command.

But true and clear ideas on the subject will, in all probability, lead, in course of time, by such observation and experiment as they will suggest, to the realization of a practice consistent and in harmony with them.

Some years ago I called attention to the importance of the "antiseptic" or "antitoxic" idea in the treatment of pulmonary phthisis. It was received, in some influential quarters, with coldness, if not with opposition; but, as a result of the observations and experiments this idea suggested, our treatment of pulmonary tuberculosis has been greatly modified in recent years, and has now been brought into more accurate relation with our pathological knowledge, to the greater credit of medicine and to the notable advantage of humanity.

Just as our fresh knowledge as to the nature of tuberculosis aroused in our minds fresh and more correct ideas as to the indications for its treatment, and then, in course of time, to consistent modifications in our practical measures, so also with regard to specific fevers, our recently acquired knowledge of their nature and mode of origin imposes on us ideas as to their therapeutic management consistent and on a level with recent pathological discoveries.

In order to avoid discursiveness and to keep this paper, as nearly as possible, within the prescribed limits, I propose to examine the treatment of only one of these specific fevers, the one with which I am best acquainted, viz.: typhoid or enteric fever, and, for my present purpose, to regard it as a type of the class of diseases to which it belongs.

It is now generally accepted that this disease, as well as other specific fevers, is of bacterial origin, and the special bacillus of typhoid fever has been repeatedly described and cultivated. It is also an accepted doctrine that these micro-organisms produce substances within the body (toxalbumins and ptomaïnes) which act as poisons on certain of the

[1] This contribution was written for the International Medical Congress at Rome, but was not read owing to the unavoidable absence of the author.

tissues, and by their toxic action excite the morbid manifestations which characterize these diseases.

These poisons act especially on the nervous, muscular, and glandular tissues in the development of those characteristic symptoms of which pyrexia or fever is one.

It is also well-known that there are many substances which, outside the body, will arrest the growth and put a stop to the activities of these micro-organisms, while there are other conditions, and notably the presence of substances in a state of putrefaction, which greatly promote their growth and stimulate their activities.

In what manner precisely the pyrexia is excited it is somewhat difficult to say; whether by the direct irritation of the cells of the organism, and especially of the muscular tissue cells, or by a toxic action on the heat-centre in the brain is uncertain. But we certainly possess many agents which are capable of controlling more or less the pyrogenic effect of these infective organisms.

The preceding considerations, which could be largely amplified, justify the following conclusions:

1. That our recently acquired knowledge as to the nature and causes of specific fevers requires a modification in the therapeutic conceptions and indications applied to their management, and

2. That the antagonism of pyrogenic and other poisons produced within the body by the micro-organisms which give rise to these fevers is the most essential therapeutic indication to be applied in their treatment.

This is the "antiseptic," or, with strict accuracy, the "antitoxic" idea as applied to the treatment of fever.

The limited scope of this paper will not admit of my attempting to estimate the practical value of the methods that have been suggested for the purpose of procuring immunity from these infective diseases; my purpose is to consider the influence of direct antagonists, and this appears to me to be of greater practical interest in connection with the treatment of a disease like enteric fever than methods of inducing immunity.

It seems to me that attempts at inducing immunity are scarcely applicable to this disease, so far as our present knowledge extends,[1] the cases of which usually come under treatment some considerable time after the introduction of the poison into the system. And but little success has attended the efforts to control the course even of a disease like tetanus by supposed immunizing agents when the cases have been severe or of some standing.

But the two methods are not in any sense opposed to one another,

[1] "On ne se soumettra pas volontiers à ces vaccinations quand on said que l'on possède beaucoup de chances pour ne pas contracter l'infection contre laquelle on veut vous prémunir." Charrin: Traité de Méd.

and I would here plead that they should be regarded as of, at least, equal importance in the study of the treatment of specific fevers.

Those who, like myself, have been withdrawn by the claims of practical clinical work from laboratory researches look to those who have still the leisure and the inclination to prosecute such researches, in the interests of practical medicine, to continue their labors as much in the direction of the discovery of means of directly antagonizing the toxic influence of infective organisms as in the direction of discovering methods of inducing immunity; and for the present I believe the former are likely to be of more practical help to us in our clinical therapeutics than the latter.

This brings me to the practical and chief contentions of this paper, viz.:

That already the results of clinical observation give promise of fruitful conclusions in the direction of obtaining effective agents for antagonizing the morbid activities of the infective organisms of specific fevers, and

That the average course and characteristics of these fevers can be, and have been, favorably modified and controlled by such antagonists.

I have myself put on record, from time to time, certain favorable results which have been observed in my own hospital and private practice from the application of antitoxic or antiseptic measures in the treatment of enteric fever; and I may say at once that as my experience widens I become more and more convinced of the value of such measures and of the practical necessity of continuing to work in this direction, so that we may improve upon our present resources, or develop them in greater perfection.

But before I refer to my own personal experience it is only right that I should indicate very briefly the recorded experience of others in this direction.

In England, Dr. Wilks, of Ashford, in Kent, was, so far as I know, one of the earliest to call attention to the wide application of an antiseptic agent in the treatment of a great number of cases of enteric fever. This was in 1870. A compound of sulphur—sulphurous acid—was the agent he employed. He gave it in 170 cases within a period of fourteen months, and he only had one death, and that patient was a habitual drunkard who would not take his medicine. This seems a very remarkable and almost incredible result; but we must remember that these cases occurred in private practice in an epidemic form, and that treatment was doubtless begun very early in most of the cases; whereas in hospital practice it is rare to see a case before the fourth or sixth day, and many are not seen until the tenth day or later. And it must be noted that the remedy was applied very thoroughly and to saturation of the system.

It was given until the patient complained "of tasting, smelling, and feeling like sulphur or lucifer matches, or, in the case of infants, until they actually emit an odor of the gas from their skins and breaths."[1]

Prof. Bouchard, who has insisted on the value of maintaining *intestinal* and attempting *general* antisepsis in this disease, with whose conclusions I am entirely in accord, has advocated the use of naphthol as an intestinal antiseptic and quinine as a general one. Dr. Tessier and many others also advocate the use of naphthol. Prof. F. P. Henry,[2] of Philadelphia, testifies strongly to the value of *thymol*. "The typical symptoms of typhoid fever will rarely develop," he says, "if thymol is administered during the first week of the disease."

Prof. Charteris and Dr. Sloan advocate the use of a pure form of carbolic acid of a higher melting-point than the ordinary acid; and in the way they administer it they[3] find it cuts short the fever, "no grave symptoms ensued, and the process of recovery was quick and attended by no wasting."

Dr. Waugh, of Philadelphia, uses sulpho-carbolate of zinc. He treated over one hundred cases in this way without a death.

Tortchinsky[4] has obtained excellent results from the use of *boric acid*; Kesteven,[5] of Brisbane, from *oil of eucalyptus*.

Maillart[6] finds the administration of large quantities of pure water, even as much as sixteen litres per diem, of great value, for its cleansing antiseptic properties. He believes it washes away the toxic products of bacillary action through the renal filter. If those large quantities cannot be taken by the mouth, he suggests subcutaneous injection, or rectal injections. It will be seen hereafter that an essential part of my method is the free consumption of pure water. Maillart applied this method in fourteen cases and lost one case only.

Shuell[7] has practised irrigations of the colon by copious injections of water rendered antiseptic by boiling—as much as two quarts at a time, his object being to promote intestinal antisepsis by removing all decomposing substances from the colon. The result of this injection is at first the evacuation of foul-smelling feces intermixed with scybala. If such irrigations are used early, the disease is rendered "comparatively light."

Dr. Fritz Hölscher, of Mulheim, reports the treatment of sixty consecutive cases of typhoid with guaiacol carbonate (15 to 30 grs. twice a day) without a death. He refers the beneficial result to intestinal antisepsis, and states that it removes the poisonous products of bacterial activity. "In the greater number of infectious diseases the art of the

[1] British Medical Journal, 1870.
[2] Hare's Manual of Practical Therapeutics, vol. ii. p. 307.
[3] British Medical Journal, December 31, 1892, and March 25, 1893.
[4] See my Manual of Medical Treatment, vol. ii. pp. 641, 642.
[5] Practitioner, May, 1885.
[6] Revue de Médecine, November, 1893.
[7] New York Medical Journal, September 2, 1893.

physician must limit itself chiefly to the elimination from the system of the toxic substances formed by the pathogenic microbes."

It is not to be supposed that the concurrent testimony of all these highly competent observers is untrustworthy, and although they may have adopted widely different agents in carrying out their ideas, the *idea* is the same, viz.: the application of an "antiseptic" or "antitoxic" agent to counteract and diminish the activity of microbic infection, or to neutralize the effects of the toxines produced by the agency of these micro-organisms.

The aim of all these efforts has been to produce *intestinal antisepsis*, an indication of undoubtedly the greatest importance. But we should, I consider, attempt more than this, and endeavor to produce also an *antitoxic* effect on the blood and the tissues, and this is, I think, possible by the use of such measures as I advocate. That future researches in this direction may provide us with better ones, I am willing to hope. Hölscher says: "From a chemical point of view there is no doubt we ought to discover for each of the toxic albumins produced in the different infectious diseases a medicament which would fix itself upon and eliminate from the blood these toxic albumins."

My first attempts in this direction in the treatment of enteric fever were made with *sulphurous acid*, the antiseptic agent employed with so much success by Dr. Wilks, and it seemed to have a remarkable effect in modifying the temperature curve and in causing a decided reduction of the pyrexia. This is well shown in a case I published, in which this remedy was given, and which ended fatally from hemorrhage and perforation.[1]

I had, however, been long impressed with the great efficacy of free chlorine as an antiseptic agent in septic conditions—or, rather, a mixture known as euchlorine, and containing free chlorine, as obtained by the action of strong hydrochloric acid on powdered potassium chlorate, especially in the treatment of the grave forms of throat ulceration occurring in cases of scarlatina maligna.

I therefore determined to use this mixture in the treatment of typhoid fever, and to give quinine in combination with it, believing, as Prof. Bouchard has maintained, that quinine acts as a *general* antiseptic in this disease.

Chantemesse[2] considers he has proved that quinine exerts a decided antiseptic power over the microbe of typhoid fever.

The mixture I use is made in the following manner:

Into a twelve-ounce bottle put thirty grains of powdered potassic chlorate, and pour on this 60 minims of strong hydrochloric acid. A greenish-yellow gas is at once liberated. Close the bottle with a cork and agitate the mixture gently until the bottle is filled with the gas, then

[1] Practitioner, June, 1882.

[2] Traité de Médecine, vol. i., p. 787.

pour water into the bottle, little by little, closing the bottle and well shaking, at each addition, until the bottle is filled.

We have in this solution several antiseptic agents all in a *state of solution*, and readily absorbable, which is one of its great merits over antiseptics not in solution; free chlorine, hydrochloric acid, potassium chlorate, and probably one or two by-products. In twelve ounces of this solution I cause twenty-four to thirty-six grains of quinine to be dissolved, and some syrup of orange-peel added to make it more agreeable to take; and of this, to adults, I order one ounce to be given every two, three, or four hours, according to the severity of the case.

I have adopted this method of treatment of all cases of enteric fever that have come under my care, both in my service in King's College Hospital and in my private practice during the past ten years, and I have had uniformly good results except in two cases; in one of these the case was not seen by me, nor accurately diagnosticated, till the second week of the fever, and the treatment was only then begun, and this patient died early of pulmonary complications; the other case was not seen by me until the end of the first week, when the case had already assumed the gravest aspect of a very intense infection—the patient had also the shock of hearing that her mother and sister were lying dead of the same disease—this patient died during the second week after a very large hemorrhage. The agminated glands along the whole of the lower part of the ileum, and the solitary glands of the large intestine were the seat of most intense and extensive ulceration.

The cure of every disease must necessarily be *conditioned;* the conditions of possible cure must exist at the time the remedy is applied. There will, from time to time, appear certain cases of typhoid fever which, either from abnormal intensity and virulence of the infective agent, or from the antecedent state of the organism invaded, or from the excessive sensitiveness of the tissues attacked, will, if not at the very outset, yet shortly after, pass into a morbid state, in which the conditions of cure no longer exist, no matter what remedy may be applied. This very obvious truism is frequently overlooked in estimating the action of remedies which are sometimes "tested," as it is termed, in cases hopeless from the commencement, and efficient remedies are accordingly discredited, and unjustly so. It should be remembered that there occur, occasionally, fierce and destructive conflagrations which water will fail to extinguish or control, yet water is none the less an extinguisher of fire.

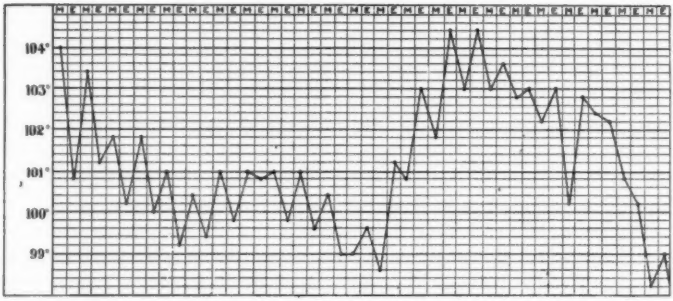
I present the temperature charts of a few of my recent cases to show the influence of the treatment over the pyrexia.

The details of other typical cases I have already published.[1]

Let me call attention to some of the effects of this treatment, which may be observed in most cases in which it is applied.

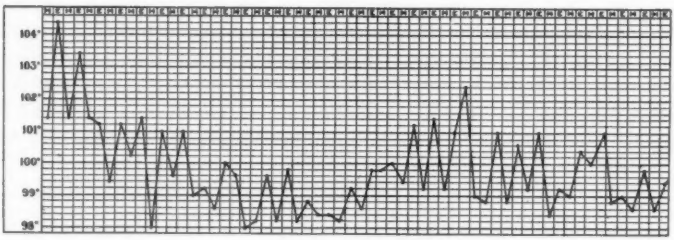
[1] Treatment of Typhoid Fever.

CHART I.



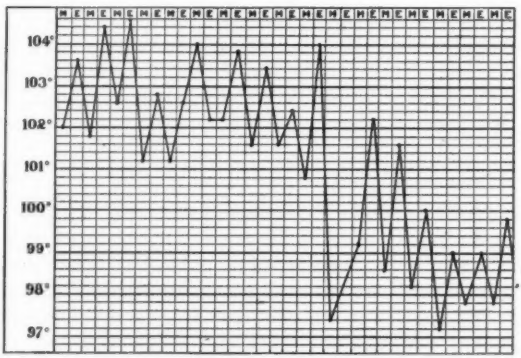
Remarkable effect on pyrexia. Rise of temperature on discontinuance of remedy. Renewal of treatment and final decline of fever.

CHART II.



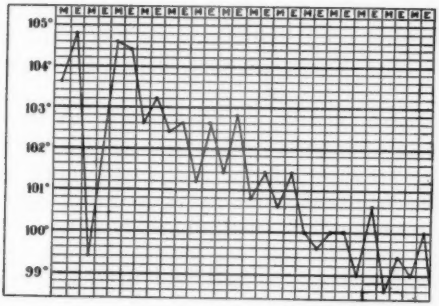
Control of pyrexia, but mild relapse. Utero-gestation; abortion at seventh month.

CHART III.



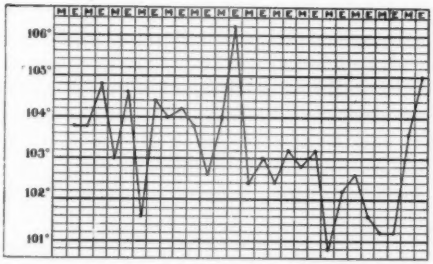
Marked abbreviation of febrile period.

CHART IV.



Remarkable influence on course and duration of pyrexia. The first considerable fall was due to an ice-pack applied before I saw the case, after which the temperature again rose rapidly.

CHART V.



Same control of pyrexia, but death from large hemorrhage.

1. There is a remarkable cleaning of the tongue and mouth. The aspect of the tongue in cases so treated is frequently quite unlike the usual tongue of enteric fever.

2. The foul putrefactive odor of the feces is rapidly removed, if the remedy be given sufficiently often and in sufficient quantity, for this fluid and perfectly soluble antiseptic certainly reaches and passes through the small intestine, as the nurses constantly report the odor of chlorine in the alvine evacuations. This surprised me at first, until I became aware how excessively defective gastro-intestinal absorption is in these cases—a circumstance to which I shall again allude. As but comparatively little of the food given is absorbed, the chlorine mixture blending with the food is carried along the intestinal canal, disinfecting as it goes, and the fluid feces when passed are found to retain the odor of free chlorine!

3. Another important effect of this treatment is a sustained depression of the febrile temperature—a continuously favorable effect on the

pyrexia. The pyrogenic toxine seems to be under control, or continuously neutralized, or excreted.

4. In certain cases, especially in young subjects, and if the treatment has been begun quite early in the case, the average course of the fever appears to be notably shortened.

5. There is another very striking effect of this treatment, and that is that the patients seem subjectively so much less disturbed by the fever poison. Their physical strength and intellectual clearness are far better maintained than by any other method of treatment with which I am acquainted. In many cases the nervous system shows none of the signs of febrile intoxication which we have been accustomed to see.

Finally their convalescence is more rapid and complete, and troublesome sequelæ, so far as my experience has extended, are unknown.

The effect upon the pyrexia of this "antitoxic" method of treatment has appeared to me to be very different from that of the so-called "antipyretic" drugs; these produce, usually, an almost immediate fall of temperature, often with profuse perspiration and considerable depression of the action of the heart; they have, as it were, a wholly independent action of their own; not so with the quinine and chlorine solution—the effect on the temperature is slowly developed (with such *moderate* doses of quinine as I advocate), and it may take forty-eight hours before any very notable effect on the temperature is produced, indeed, the temperature may actually rise a degree, or even more, in the first twenty-four hours of its administration, which appears to me to indicate that the antipyretic effect is due to a *general* antagonizing influence on the pyrogenic poison in the tissues, rather than from any immediate or direct effect on the heat-regulating mechanism.

My own observations and experience with this method have been corroborated by other entirely independent observers.

Dr. O'Connor, of Buenos Ayres, has sent me a message that he has applied this method of treatment in one hundred consecutive cases of typhoid fever, and has only had two deaths.

Dr. James, of Humansdorf, Cape Colony, writes to me that "it has yielded splendid results in typhoid fever" in his practice.

Dr. Edwards, of the Bootle Fever Hospital, writes to the same effect, and similar testimony has been volunteered by many other medical men at home and in the colonies.

But it is the truth of the *general idea* that I am most concerned here to establish rather than any particular method of carrying it out.

Extraordinarily good results have been recently claimed from the administration of guaiacol carbonate in typhoid fever, and it is a remarkable circumstance that the success attending the use of this substance in another bacillary infection, *i. e.*, tuberculosis, should have suggested its use in typhoid. It shows the value of the *general therapeutic idea* in promoting progress in practical medicine.

It is well known that in the presence of putrefactive processes bacillary action is remarkably stimulated, and I am not aware that it has hitherto been pointed out that the intestinal lesions of typhoid fever offer a remarkable illustration of this fact. The glandular infiltration, inflammation, and ulceration observed in the walls of the ileum begin *just where the intestinal contents begin to undergo putrefactive decomposition*, and they become more and more intense as we descend to the ileo-cæcal valve. They are also observed in the solitary glands of the colon, but here the fluid contents of the bowels are not long retained in contact with the mucous membrane.

If we can restrain *early in the disease* these putrefactive changes in the intestine we may confidently hope to restrain the morbid activity of the typhoid bacillus, and thus we see how the production of *intestinal antisepsis* becomes an urgent and early indication in the treatment of these cases. We are greatly indebted to Prof. Bouchard for pointing out this indication so clearly and forcibly as he has done. A calomel or other purge in the initial stage of the fever (if diarrhœa does not exist), and washing out the large intestine twice daily with naphtholated water enter into Prof. Bouchard's (and my own) conception of intestinal antisepsis.

But this intestinal antisepsis cannot be carried out thoroughly without great consideration, care, and observation in the matter of *feeding* the patient. We must adopt a method of feeding which shall by no possibility leave a bulky residue of unabsorbed material to undergo putrefactive changes in the lower part of the small intestine, and by its presence *there* excite and maintain diarrhœa and provoke an extension of the ulcerative and inflammatory changes dependent on bacillary infection of the intestinal glands.

For this purpose we must note carefully what digestive and absorptive activity exists in each individual case. In many this will be found to be *extremely small!* Let this be well noted, for the neglect to do so is responsible for much avoidable mischief. The fault usually lies in the too free administration of milk. I have again and again seen milk break down utterly as a food for typhoid patients. In some cases I have seen it vomited as a firm, cheesy mass soon after it has been taken into the stomach, and in many others I have observed the maintenance of diarrhœa to be dependent upon the irritation of masses of milk curd passing through the inflamed and catarrhal intestine. These are obvious instances of the failure of milk as a food. There are others, far more common, in which it will be found, if the alvine dejections be carefully examined and estimated, that nearly, if not quite all, the casein of the milk taken as food is passed undigested, not as coarse curds, but as a fine deposit from the so-called "pea-soup" stools. I have again and again proved this, and shown that the amount of milk absorbed is in many cases remarkably small; and to persist in giving food that is not absorbed is to persist in introducing decomposable material into the intes-

tine when we wish to keep it free from putrefactive decomposition, and to maintain diarrhœa when we wish to keep the bowels at rest. It is the popular *mania* for feeding which induces us to give food when it simply passes as an irritating decomposing substance along the intestinal tube. Remember that it is useless and injurious in these cases to give food that is not absorbed. Estimate accurately the absorptive capacity of the patient. If he cannot absorb milk at all, give him some other food. If he cannot absorb four pints in the twenty-four hours, give him two, and if he cannot absorb two pints, give him one, and if he cannot absorb more than one-half a pint, give him one-half a pint.

Give all food *very dilute;* milk should be diluted with twice its bulk of water. We wish for antiseptic and eliminative purposes to give as much pure water as the patient will drink—give it then as a diluent of his food. When milk, however small in quantity, absolutely disagrees, very dilute, freshly-made, clear soups, in the making of which some *aromatic* herbs have been used, is the best substitute. Dilute albumin water, made with the white of an egg, is also then serviceable. Give whatever intestinal antiseptic you may be using at the same time as the food, so as to keep it from putrefactive decomposition. The antiseptic principle, when applied to the feeding of typhoid patients, necessitates then the administration of food in a dilute liquid form—food *that remains liquid in the body* as well as *outside* it, and that is not prone to be suddenly rendered solid by chemical change, as undiluted milk is. I am not suggesting that milk should not be used in a diluted form whenever it is found to be well tolerated and freely absorbed, but I would urge the necessity of exchanging it for other food when it is seen that much solid though finely reduced casein is passing in the motions.

As to the use of alcoholic stimulants, I believe the general tendency is to give them too early and in too large quantities. They are needed, in moderation, toward the end of the most severe and protracted cases; but the less severe cases do better, I think, without any. I have used, in association with moderate quantities of alcohol, in protracted cases, with marked cardiac debility, *infusion of coffee* with, it has seemed to me, more marked and sustained stimulation of the heart than when alcohol alone has been given. We have too much neglected those excellent cardiac stimulants—tea and coffee—in the treatment of fevers.

We must not expect that success will uniformly attend the application of the method of treatment I have been advocating—*i. e.*, an antitoxic or antiseptic method—unless we are enabled to apply it *early* in the disease. Every day, every hour that is lost in allowing the products of the infective microbe to be diffused widely through the system will tend to lessen the efficacy and minimize the effects of our medicinal antagonists.

If time is lost at the onset, the virus becomes diffused, and an intense

general infection may occur; and then, if the individual tissues are especially sensitive to the virus, no remedies may be able to prevent the occurrence of a fatal lesion, such as excessive hemorrhage from deep ulceration or perforation. One great advantage in establishing complete intestinal antisepsis, and in attempting for this purpose to give just as much food as will be absorbed and no more, is that we are enabled, in the advanced period of the disease, to keep the intestinal canal *at rest*, a most important indication in connection with the intense ulcerative processes which are usually present there in severe forms of typhoid. I am accustomed to give for this purpose small enemata of two or three ounces of starch mucilage, each containing about ten grains of tannin and five grains of Dover's powder. This not only allays intestinal irritability, but it is useful in quelling nervous excitement also. But I shall not dwell here on further details of management, as I have fully considered these elsewhere. (See my *Manual of Medical Treatment*, vol. ii., part ix., chap. 3).

I object to the free use of *depressing* antipyretic agents merely as reducers of temperature, as they simply attack a symptom, and they should be reserved exclusively for those cases in which the symptom they attack is for the moment the *all-important* symptom of the disease, viz., for states of hyperpyrexia. For this purpose I occasionally, but very rarely, use a small dose of phenacetine (five grains). Even in such small doses I have been concerned at the great cardiac depression it at times occasions. We should not, without much hesitation, give to a sick and debilitated man drugs that would make a sound and strong man seriously ill.

With regard to the routine cold-bath treatment of typhoid, for my own part, I am disposed to leave it, almost without comment, to those who like it. Personally I have seen calamitous results occasionally follow its indiscriminate application. I do not doubt its essential value in certain cases of hyperpyrexia. It, however, attacks a result of the disease only; it is not wholly free from risks of its own, as I can from my own experience testify; it is difficult to apply continuously, and unless applied continuously, often fails to reduce temperature, except for a brief period. As a tiresome and inconvenient method of treatment, its great claim to adoption was the superior results it was stated to yield. The method I advocate has yielded in my own practice and in that of others better results, and I therefore prefer it.

In this necessarily brief paper I have been compelled to pass over unnoticed many relevant matters. I have not attempted to determine the precise manner in which "antitoxic" or "antiseptic" remedies act: whether by weakening the virulence of the invading organisms by modifying the fluids in which they live, or by strengthening the power of resistance or of attack in the cells of the blood and tissues, or in some

other manner. My chief object and desire has been to place before this Congress a *therapeutic idea*, consistent and in harmony with our pathological knowledge, to point out the success which has attended its practical application in the treatment of one of the most prevalent and widely diffused of the specific fevers, and to obtain, through the sanction and approval of this Congress, its further development and adoption.

APOPLEXY IN ITS RELATION TO THE TEMPERATURE OF THE BODY, WITH A CONSIDERATION OF THE QUESTION OF HEAT-CENTRES.[1]

By Charles L. Dana, M.D.,
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The subject to which I wish to draw your attention to-day is that of the relation of apoplexy to the bodily temperature. By the term apoplexy I include both intra-cranial hemorrhages and softenings due to embolism or thrombosis. For several years I have been paying special attention to the effects of these insults to the brain upon the elevations of the temperature of the body, and I have accumulated sufficient material to justify me, I hope, in presenting some conclusions regarding the matter. The data which I have used in the present paper consist of observations upon over eighty cases of apoplexy in which an autopsy was made, and the nature and seat of the lesion noted. The points which I have sought to clear up in a study of these records have been: First, the general bodily temperature directly after an apoplectic stroke, and the later course of this temperature, if such is found to exist. Second, the temperature of the two sides of the body as compared with each other, and with that in the rectum. Third, the relation of the temperature change to the nature of the lesion, and, fourth, its relation to the seat of the lesion, including in this last a brief discussion of the subject of thermic centres in the brain.

As to the question of the direct effect of intra-cranial hemorrhages upon the general bodily temperature, my statistics (45 cases) show that in fatal cases, at least, there is on the first day after the stroke, a rise of rectal temperature, ranging from 100° to 102°, averaging in my cases nearly, if not quite, 101.7°. On the second day, if the cases are not immediately fatal, the temperature falls a little, and averages about 101° or 101½°. In acute softening, however (38 cases), there is rarely any disturbance of temperature, even in fatal cases, on the first day. On the

[1] Read at a meeting of the Association of American Physicians, May 31, 1894.

second there is often a slight rise, so that the average is 99½° to 100°. Thus the presence of any temperature on the first and second days indicates a hemorrhage, and is, in addition, of serious import.

Neither hemorrhages nor softenings produce a high temperature themselves. The fever, if it exists, is only 101° to 102½°, or, perhaps, 103°. In those cases in which there is a terminal high rise of 105°, or even 107°, a pneumonia, and sometimes even a gangrenous pneumonia, is found. I note only one exception to this in my cases, and then the clot was in the thalamus.

This general law, that the temperature rises after a serious hemorrhagic laceration of the brain, and does not rise after a serious embolic or thrombotic softening of the brain, has only few exceptions, as when the embolic process is extremely large, involving, perhaps, an entire lobe, or when it is seated in the pons or medulla, or when it is due to a septic focus; but such cases are so rare that they do not invalidate the general clinical rule which I have laid down. While I have based it mainly upon temperature observations of my own, because these have been taken with special care and with special reference to this point, yet they tally also with the records of others, so far as my investigation goes.

The question of the *unilateral disturbances of temperature* after an apoplectic stroke is one that has interested me particularly, because it has seemed to furnish a more definite criterion of the nature of the injury. I have observed now seven cases of acute cerebral softening and three of cerebral hemorrhage in which the temperatures were taken in each axilla for some time after the stroke, and in some cases also in the rectum. Autopsies have been made also upon each of these cases. I have collected several other cases in which similar records have been made. I have also notes of a considerable number of cases in which the diagnosis of hemorrhage or softening could be made with approximate certainty. From the facts which I have thus obtained it has seemed to me that one can say with much certainty that in massive intra-cranial hemorrhages the temperature upon the paralyzed side is always somewhat higher than it is upon the sound side. In all my cases of cerebral hemorrhage there was on the first days, and continuously afterward, a greater rise of temperature on the paralyzed side, the average difference being one degree. On the other hand, in all my cases of acute softening, whether due to embolism or thrombus, there was practically no difference whatever between the temperature of the paralyzed and of the sound side. These conclusions seem to me to be in accordance with what we might naturally expect. The sudden tearing of the brain by the hemorrhage causes a certain amount of brain compression, and a greater functional disturbance than is caused by a simple obliteration of the artery's lumen. Surgical experience seems to confirm also the fact that brain lacerations are attended by rise of temperature.

Thus, Dr. Charles H. Phelps has called attention to the great uniformity of elevated temperature in injuries to the head, attended with contusion or laceration of the cortex. He thinks that there is sometimes an initial fall of temperature, followed by a progressive rise, and that this rise is a more constant symptom than unconsciousness. In 83 cases, of which in 45 there was an autopsy, this elevation of temperature was noted. He thinks it due to injury to the cortex, but does not place it in relation with any special portion of the cortex, or to any heat centre.[1]

I append here the histories, much condensed, and the charts of the cases illustrating the temperature changes to which I have referred. I might add at this point one word with regard to the preliminary sudden fall of the temperature in cases of apoplexy. This preliminary fall is certainly a thing of rare occurrence. In my own experience I have seen it only once, and in looking over records of nearly two hundred cases of apoplexy due to hemorrhage or softening, the report of a preliminary temperature fall was not made. This, to be sure, may be explained on the ground that most of our hospital cases and many of our private cases are not seen until some hours after the shock occurs. I can only say, therefore, that practically it is a phenomenon rarely observed, and as I have seen it occur both in embolism and in hemorrhage, it has not a very great diagnostic value; still it undoubtedly does occur at times and it occurs more frequently with hemorrhage than with softening.

Cases of Cerebral Hemorrhage.

Case I.—Julius Z., aged sixty years, admitted to hospital, January 17th; no previous history. Patient completely unconscious, breathing heavily; pupils even and moderately contracted. Total motor paralysis of right side, with well-marked anæsthesia of face and arm, less marked of trunk and leg. Heart and urine normal. Next day stupor not so extreme, occasionally speaks; anæsthesia less; paralysis the same. The next three days patient continued about the same. Death on the sixth day. Temperature as indicated in chart.

Autopsy. Lungs normal; heart normal. Extensive cerebral hemorrhage in left cerebrum between optic thalamus and left lenticular nucleus, involving the thalamus, extending into the left lateral ventricle and somewhat into the right. Small clot in fourth ventricle from passage of blood through aqueduct of Sylvius.

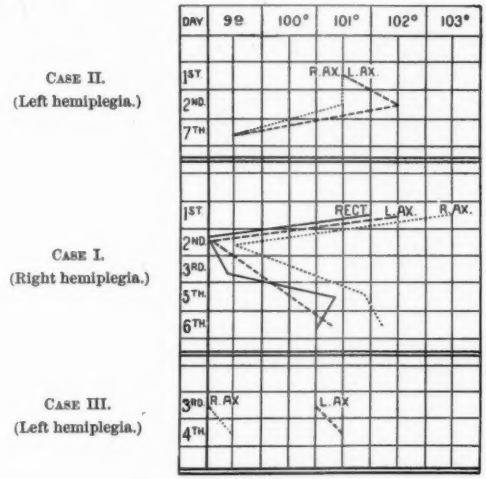
The records of Cases II. and III. were unfortunately mislaid after the temperatures had been charted. The following case is incomplete, but has some confirmatory value.

Case IV.—Male, aged seventy years. Fell down suddenly with right hemiplegia, later became unconscious. Next day brought to Bellevue

[1] New York Medical Journal, January 14, 21, and 28, 1893.

Hospital (August 18th). Unconscious, hemiplegia of right side; pulse 72 and full. "Skin warm on right side, cold on left." Temperature 99½°.

CHART I.

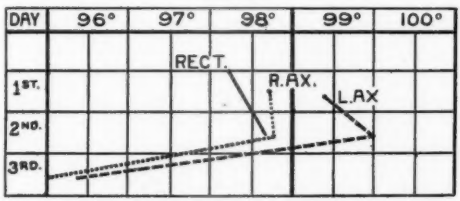


Died on second day. Autopsy showed hemorrhage involving the left corpus striatum and optic thalamus and breaking into ventricles. Beginning hepatization of lungs.

Cases of Acute Softening.

CASE V.—Leonardo L., aged forty-four years, brought to hospital June 4th; was partially conscious and spoke a few words; soon lapsed into semi-conscious condition from which he could be roused with difficulty. Total paralysis of left side, with diminished reflexes. Pupils equal, respond sluggishly; analgesia of left side, as shown by pricking with needles. Patient continued in semi-conscious condition, and died on third day. Temperature as indicated in Chart II.

CHART II.

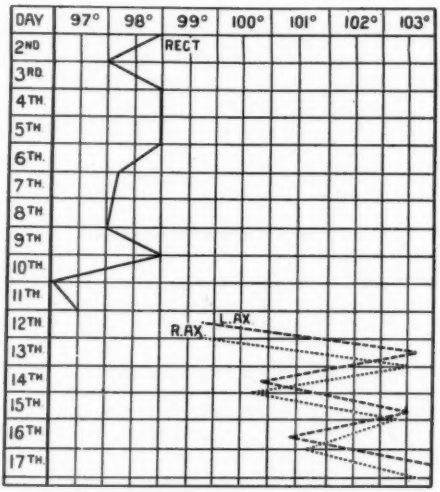


Autopsy. Brain showed a softening about the hippocampus major of right side; the area of softening extended into the central white matter

of the occipital lobe and forward into the temporo-sphenoidal lobe. The hippocampal convolution and gyrus fornicatus were not involved, but the area of softening was such as might include fibres from these parts. The basal ganglia were not involved; pons and medulla normal.

CASE VI.—Peter J., aged fifty-nine years; syphilis twenty-four years previously. Heavy drinker. Patient felt well up to previous night when he retired. Next morning, on arising, felt a numbness and weakness in left side. Was brought to the hospital next day. There is fine tremor and some ataxia in both arms; ataxia more marked on left side. Marked loss of power in left hand and leg, with exaggeration of deep reflexes. Urine normal. Intelligence fairly good at first, but patient gradually became semi-conscious and delirious, and died November 22d,

CHART III.

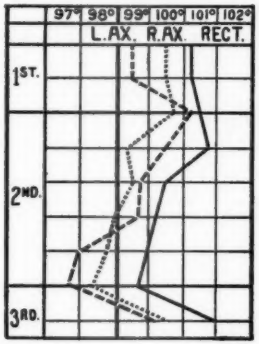


twenty-two days after admission. No temperature records were made between November 4th and 16th. The temperature in the rectum from the day after admission up to November 4th ranged from 99$\frac{1}{5}$° to 97$\frac{3}{5}$°, there being no marked variations. On the second day it was 98$\frac{1}{2}$°, on the tenth day 98°. On the fourteenth day temperatures were taken in right and left axillæ, giving records such as are shown in Chart III.

CASE VII.—John B., aged seventy-three years, German, was admitted to the hospital March 9th in a condition of coma. No history. The patient can be partly roused to a consciousness of his surroundings. Face flushed; breathing quiet. Head and eyes turned to the right. Pupils moderately dilated and even. Marked rigidity of all the limbs, most pronounced in the left arm. The left hand and fingers are held rigid, the fingers being flexed. Heart-action weak. Slight amount of albumin in the urine. Twenty-four hours after admission the patient had slight spasms, beginning with convulsive movements of the face and left

hand. The patient was bled seven and one-half ounces from the arm, and seemed more conscious on the second day. The record shows that after this the coma gradually deepened, and the patient remained comatose, dying early the third day. The temperature record of the three days

CHART IV.



that he was in the hospital was taken in each axilla and in the rectum, and is indicated in Chart IV. Post-mortem showed in the brain two spots of softening, involving symmetrically each lenticular nucleus, and more particularly the globus pallidus.

This case I shall refer to again, because of its interest in connection with heat-centres. The temperature, as will be seen, did not rise in the axilla above 100.2°, and was most of the time normal. The rectal temperature showed a slight rise only. The temperature was taken very carefully eight times during the three days of the patient's presence in the hospital.

CASE VIII.—Thomas P., aged forty years, had suffered from locomotor ataxia for ten years; was still in the walking stage. Had a history of syphilis fifteen years before. Had a severe valvular heart lesion with hypertrophy. Sudden complete left hemiplegia, with inability to articulate or swallow except with great difficulty. The paralysis was almost total of arm and leg. The patient was semi-conscious and at times delirious. No anæsthesia. He improved slightly for four days, then grew worse, and died on the eighth day. His temperature was taken in the axillæ three or four times a day during this whole period. The temperature in the first twenty-four hours ranged in each axilla from 100° to 101°, being equal on the two sides. It fell a little below 100° on the second day, and continued at about 100° until the day before death, when it sank in each side to 98° or 99°; at one period it fell as low as 96.4°. The record is shown in the table.

The *autopsy* showed a large embolus blocking up the right middle cerebral artery, and causing an area of softening, involving the internal capsule and corpus striatum, some of the optic thalamus and centrum ovale. The heart showed serious valvular lesions as well as hypertrophy.

Temperature in Case VIII.

Time.	Right axilla.	Left axilla.
1.00 A.M.	101	101⅔
7.00 "	100	100⅓
12.20 P.M.	100⅕	100⅗
7.15 "	102	101⅓
January 29, 1890.		
7.30 A.M.	99	99⅓
2.45 P.M.	99⅕	100⅖
7.15 "	100⅘	100⅘
January 30.		
7.00 A.M.	99	98¾
12.00 M.	99⅘	99⅗
7.00 P.M.	101⅖	101
January 31.		
7.00 A.M.	100⅖	100⅕
12.15 A.M.	101	101
8.00 "	100	100⅓
February 1, 1890.		
8.00 A.M.	99	99⅓
12.30 P.M.	99⅖	99
7.00 "	100⅗	101
February 2.		
8.30 A.M.	97⅓	98⅓
1.45 P.M.	98	99
7 00 "	100	100
February 3.		
12.30 A.M.	98	99
8.00 "	96⅖	96⅓
12 00 M.	96⅓	98

CASE IX.—Ann G. Sudden right hemiplegia with motor aphasia, dysphagia, right hemianæsthesia very marked in the face. Intelligence dull. Early rigidity of paralyzed side; progressive weakness; death in two months.

This patient, whose history I have detailed in my article on "The Cortical Localization of Cutaneous Sensations," showed a continuous difference of temperature of the two sides, amounting for a time to a degree or more, and in particular an initial fall of temperature on the non-paralyzed side during the first two days. There was, however, at no time any marked rise of temperature on either side, the range being 98.5° to 99.5°.

The *autopsy* showed atheromatous arteries and a large patch of yellow softening, involving the second and third left frontal and part of the lower half of the precentral convolution of the left side.

CASE X.—A woman, aged sixty years; left hemiplegia; death on the fifth day. Temperature on the fifth day in each axilla 98.5°. The *autopsy* showed thrombosis of the right middle cerebral.

The clinical and pathological evidence which I have collected and presented here does not, as a matter of fact, represent all the evidence which I possess to sustain the view that hemorrhages cause in the first place a greater immediate rise of temperature, and in the second place a greater unilateral difference in temperature than softenings do. One must bring to bear upon the judgment of such questions personal experience in cases where the positive pathological data are not obtainable, as well as the experiences of other observers; and it is with a full consideration of these facts in mind that I have reached the conclusions which I have stated.

We come now to the third question, that is, as to the effect of the *special localization of clots or softened spots upon temperature changes*,

and this question brings up at once the whole subject of thermic centres.

The experimental investigations made for the purpose of discovering heat-centres have been numerous, and it is not my purpose to go into this subject extensively. The work of Ott,[1] Wood,[2] and Reichert[3] in this country, of Hale White[4] in England, of Aronsohn and Sachs,[5] Landois, Eulenburg, Girard,[6] Baginsky and Lehmann,[7] and Baculo[8] on the Continent, has produced results which are somewhat conflicting.

Some experimenters have found that injuries of the caudate nuclei and corpora striata produce a rise of temperature. Ott finds a rise of temperature resulting from a puncture just in front of the caudate nuclei, but lays especial stress upon the tuber cinereum as a heat-centre. Reichert finds (1) that the automatic thermogenic centres are located in the spinal cord; (2) that the cruciate and Sylvian centres are thermo-inhibitory; (3) that the caudate nuclei and medulla oblongata contain thermo-accelerator centres; (4) that no specific heat-centres probably exist in the optic thalami; (5) that specific thermotaxic heat-centres, *i. e.*, centres having a common control over both heat production and heat dissipation do not exist.

Nearly all observers find that lesions of the corpus striatum are followed by marked increase of temperature, generally due to increased heat production. Baculo believes that the thalami are heat-centres, but both Reichert and White seem to doubt this. In some experiments of Wood and White lesions of the crura cerebri were followed by febrile rise, but Reichert does not confirm this view. Nearly all experimenters agree that lesions of the pons cause a rise in temperature. White thinks that lesions of certain points of the cerebral cortex may cause a rise of temperature and also lesions of the crura cerebri and of the septum lucidum.

About all that one can conclude from the physiological experiments thus briefly referred to is that injuries of the corpus striatum and of the pons cause a rise of temperature. As to whether injuries of the tuber cinereum or optic thalamus or cortex have a similar effect the evidence is still conflicting. It seems to be pretty well agreed that injuries of the white matter of the cerebrum and of the central and occipital lobes of the cerebellum do not cause temperature elevations.

The question arises now whether these somewhat conflicting physio-

[1] Therapeutic Gazette, September, 1887; Journal of Nervous Diseases, April, 1894.
[2] Smithsonian Contributions: Fever.
[3] University Medical Magazine, March, 1893, and 1894, p. 303.
[4] Journal of Physiology, 1891, vol. xii. p. 233.
[5] Pflüger's Archiv f. Physiol., lvi. p. 237.
[6] Archiv de Physiol., 1886, viii. p. 28.
[7] Virchow's Archiv, 1886, cvi. p. 258.
[8] Journal of Nervous and Mental Diseases, March, 1891.

logical data can be applied to clinical medicine. Dr. Hale White has endeavored to fulfil the task of making this application, and in the various articles which he has written[1] has reported cases of his own and of others which lead him to think that there are thermic centres in the brain. He reports cases in which lesions of the corpus striatum were followed by rise of temperature; also cases of lesion of the cortex and of the pons with similar phenomena. His cases, however, do not, in my opinion, stand close critical analysis. In Case II., for example, which is cited as an illustration of lesion of the corpus striatum with fever, the hemorrhage extended into the right and third ventricle. In Case VIII. his patient, a boy of six and a half years, had right hemiplegia for three months before any fever came on; then he had convulsions. Autopsy showed a double lesion of the corpora striata. In another case[2] a man had paraplegia for a year before fever came on. Autopsy showed a bilateral softening of both internal capsules, involving slightly both the striata and the thalami. He quotes a case of Ollivier in which there was a hemorrhage into the optic thalamus and crura cerebri with a temperature of 102°, and another case of hemorrhage into both optic thalami with a temperature of 105.7°;[3] also a case of Wernicke's of hemorrhage into the basic ganglia with a temperature of 105°;[4] and one of Bourneville's of hemorrhage into the optic thalamus, ventricle, and corpus striatum with temperatures of 103.4° and 107.6°.[5] Another case supposed to be in point is one reported by Bagojawlewski, of echinococcus of the corpus striatum with rise of temperature.[6] All these cases, however sympathetically considered, seem to me to carry but slight weight, for, in the first place, very few of them are strictly localized lesions; in the next place, as I have already shown, sudden lacerating lesions, like that of hemorrhage, will, if of any extent, cause rise of temperature, no matter where located, as a rule; and, finally, there are cases of localized lesions of these supposed thermic centres in which no hemorrhage has been found. I have myself reported above a case of bilateral lesion of the striatum without any fever, and I have the records of a similar case with similar absence of temperature rise. I have no doubt that a diligent search of records would lead to the accumulation of a great deal more negative evidence. With regard to lesions of the pons, however, there is more uniform agreement. Undoubtedly a lesion of the pons, unless very small, will cause immediately a rise of temperature. As for lesions of the cortex, it is the opinion of Dr. Phelps that contusions of this region, wherever they occur, are

[1] Guy's Hospital Reports, vol. xxvii., 1884; Lancet, July, 1890; International Clinics, 1893, p. 163.

[2] Lancet, June 29, 1891.

[3] Gazette Hebdomadaire, 1875, No. 12.

[4] Lehrbuch der Gehirnkrankheiten, ii. 48.

[5] Etude clin. et thermomét. sur les Maladies du Système Nerveux.

[6] Centralblatt f. d. med. Wissenschaften, 1888.

almost uniformly associated with rise of temperature; and he is inclined to believe that this rise is dependent, not upon the point of location of the lesion, but upon its character. Surgeons who operate upon children are familiar with the sudden shooting up of the temperature for twenty-four hours after a linear craniectomy, and this rise is, perhaps, due to some temporary injury of the cortex.

My own cases bearing on thermic localization are—some of them—of much interest. Thus in Case VI., Peter J., above referred to, the temperature ranged never above 99° until the twenty-first day; then it gradually rose to 100° and 104°, as shown in chart. The autopsy record reads: "On the outer edge of the right lenticular nucleus there was a patch of softening about the size of a bean. There were also many capillary extravasations in the lenticular nucleus and in the adjoining internal capsule." The lungs were practically normal. Left brain normal. This case might be used by the localists, but the lesion was present for three weeks before the fever.

In Case VII., above cited, there was a double softening of the lenticular nucleus, and here the temperature rose on one day to 101.8° in the rectum, but its general average was but slightly above normal.

I have another case of localized clot in the lenticular nucleus. The patient had hemiplegia, but gradually improved. A few weeks later she developed pneumonia and died. Temperature records are given as soon as the pneumonia appeared, and I can only infer that, according to custom, it was taken at first, found normal, and then not recorded.

Cases of complete blocking of the middle cerebral with hemiplegia due to softening, involving the corpus striatum, without fever, are, I believe, not uncommon. Case X. illustrates one of this class.

My cases illustrating lesions of the thalamus and neighboring parts are also of interest.

Case XI. is that of a man, aged sixty-four years, who was admitted with left hemiplegia and hemianæsthesia and dulled intelligence. He became somewhat delirious and died on the seventeenth day, eight weeks after his attack. During the last four days of his illness the temperature ranged from 97.6° to 98°.

Autopsy showed an old hemorrhage occupying the site of the right optic thalamus. On the outer side of the old hemorrhage is a more recent one. Here is a *clot in the optic thalamus with subnormal temperature.*

Case XII. is that of a man admitted to the alcoholic cells with delirium tremens and a temperature of 105°. He died on the third day with a temperature of 105.8°. Autopsy showed a clot the size of a bean in the middle of the right optic thalamus; brain intensely congested; lungs normal. Here, however, the febrile disturbance might have been due to alcoholism.

Case XIII. may have some interest in connection with Dr. Ott's theory that the tuber cinereum is a thermic centre. The patient was a

woman of fifty years, who came into the hospital in a semi-delirious state. She had small rigid pupils and slight right hemianæsthesia. She continued nearly comatose for eight days, and died of œdema of the lungs. Temperature on admission, 102°. It ranged between 100° and 102° until she died. Autopsy showed "softening of the inter-peduncular space;" third ventricle, the optic thalami on each side were slightly softened. The corpora quadrigemina were slightly affected.

I have records of a case of softening of the frontal lobes with normal temperature, and one of hemorrhage into one frontal lobe with a temperature of 102°. But my paper has already exceeded its limits.

Taking all the facts into consideration, it seems to me that we cannot yet assert that there are any definite heat-centres in the human brain, and can only say that temperature rises are more apt to be caused in man by lesions of the pons than elsewhere, and next to this by lesions of a hemorrhagic and lacerating kind, involving the cortex cerebri. It is a fact of some importance, and one to be borne in mind in estimating the value of experiments on animals, that the regions which cause temperature rise are also those which are most vascular, and lacerations of such parts must necessarily have a greater traumatic importance. Then again, the transference of the results of animal experiments to man involves a good many elements of error. The corpus striatum of the rabbit, for example, is a very important part in that animal's brain; but in man this ganglion is a latent region and is probably a rudimentary organ, a vestigium, whose original work has been transferred to the brain cortex. Man gets along very well with badly injured striata, but the rabbit does not, and heat-centres in this latter animal would not have necessarily the same locus in man.

So far as my own positive results are concerned, I have but few data. In two cases where the optic thalamus was especially involved in hemorrhage there was a very high temperature, but in almost all my cases the high rises of temperature were associated with extensive lacerating lesions or else with some superimposed inflammatory process in the lungs. This latter fact must always be borne in mind in reporting cases of apoplexy with subsequent fever. Very often a sharp rise of temperature in three or four days after a stroke indicates only a beginning pneumonia, and in two of my cases I have found the pneumonic process to be fetid in character and accompanied naturally with a very high fever.

Allow me now, gentlemen, in conclusion, to review the results which I have endeavored to reach. They are:

1. That all intra-cranial hemorrhages, whatever their lesion, are much more apt to be accompanied with immediate disturbances of temperature than are necrotic processes from embolism and thrombosis. These temperature disturbances in hemorrhages are, in rare cases, a sudden initial

fall; then in almost all cases except where the lesion is small, there is within a day or two a rise of temperature of from one to three degrees. On the other hand, in acute softening this initial fall and early rise do not occur unless the process is very extensive or involves the pons.

2. In apoplexy due to hemorrhage, the temperature is greater upon the paralyzed side than on the normal, the difference averaging about one degree. In acute softening this unilateral difference of temperature does not occur or is extremely slight.

3. The rise of temperature due to apoplectic lesions depends more upon the extent and nature of the lesion than upon its location. Lesions of a hemorrhagic character in the cortex, however, are especially apt to cause a rise of temperature. Lesions in the pons also either of hemorrhagic or softening character, almost uniformly cause a rise of temperature.

4. There is as yet no clinical evidence that lesions of the basal ganglia or the parts about them cause temperature rises on account of destruction of certain thermic centres; in other words, the clinical and pathological evidence of thermic centres in the human brain, aside from the parts mentioned, is yet inadequate.

5. Finally, gentlemen, I would specially impress upon you the great value, from a diagnostic point of view, of a careful study of the temperature changes after apoplectic strokes. The temperature should be observed on each side of the body, in the rectum, also, if possible. With data thus obtained one can, I feel sure, gain much more positive evidence as to the nature of the lesion in these cases, and I have repeatedly been able to satisfy myself, in my clinical work, of the nature of the lesion by means of the methods referred to. I do not believe that with the help of the numerous factors which we now have in aiding our diagnosis there are many cases of apoplexy in which it is difficult to make a diagnosis. The old-time tabulation of differential points in diagnosis between hemorrhage and acute softening still remains of value. We need, and must use, all the helps possible; but if we, in addition to other methods, carefully apply the thermometric, I am sure we can reach vastly more satisfactory results.

Previous Papers on Apoplexy by the Author.

"Forms of Cerebral Hemorrhage." *Medical Record*, August, 1890.

"Diagnosis of Intra-cranial Hemorrhage and Acute Softening." *Medical Record*, July 25, 1891.

"Vertigo in Temporal Lobe Lesions." *Journal of Nervous and Mental Diseases*; July, 1889.

"Hemorrhage in Cerebral Abscess."

"Primary Hemorrhage in Lateral Ventricle." *Journal of Nervous and Mental Diseases*, 1892, p. 47.

"The Apoplectic Pulse." The *Post-Graduate*, 1893, p. 276.

THE BACTERIOLOGY OF PYELONEPHRITIS.[1]

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In considering the etiology of nephritis a broad distinction must be made between those forms known under the general name of Bright's disease and pyelonephritis, or the so-called surgical kidney. In the first-mentioned forms, which may be denominated hæmatogenous, the primary cause of the renal inflammation is, as a rule, and perhaps always, some toxic substance in the blood which acts as an irritant to some portion of the renal parenchyma. And when micro-organisms are found in the urine in cases of this kind or in sections of the kidney removed post-mortem, their presence is probably to be regarded either as accidental or as secondary to the changes in the kidney, rather than a cause of these changes. It is not at all unusual to find colonies of micrococci or of bacilli in the necrotic foci found in certain forms of nephritis, but the inference that the inflammatory process and resulting necrosis were due to these bacteria is not justified either by the microscopic appearances of the sections or by experimental investigations. On the other hand, in ascending nephritis or pyelonephritis, which is very commonly secondary to a cystitis of long standing, there is good reason to believe that the inflammatory changes and pus formation depend principally upon the presence of certain bacteria which are found in the urine of such patients during life and in the diseased kidney removed by surgical operation or post-mortem. And recent researches show that the bacillus coli communis, which is constantly present in the intestine of healthy individuals, is found more frequently than any other micro-organism in the so-called "surgical kidney." This bacillus is now known to be the usual cause of peritonitis. It has been obtained, in pure culture, from a number of cases (8) of abscess of the liver,[2] from urinary abscesses (6),[3] and from the pleural cavity in certain cases of pleurisy (9).[4]

The most important and comprehensive work upon the bacteriology of pyelonephritis is that of Schmidt and Aschoff,[5] published in Jena in 1893. The authors named give a complete *résumé* of the literature of the subject, and a full report of fourteen cases of pyelonephritis, in which they have made bacteriological investigations. They also report

[1] Read before the Congress of American Physicians and Surgeons, Washington, May 31, 1894.

[2] Bignami, Stern, Netter and Martha, Rodet and Roux, Létienne, Veillon and Jayle, Vivaldi, Levy.

[3] Krozius, Clado, Albarran and Hallé, Tuffier and Albarran.

[4] Albarran and Hallé, Sevestre, Renard, Lesage and Macaigne, Levy.

[5] Die Pyelonephritis in anatomischer und bacteriologischer Beziehung, und die ursächliche Bedeutung des Bacterium coli commune für die Erkrankung des Harnwege.

a series of experiments upon rabbits, in which injections of a pure culture of the bacillus coli communis were made into the left ureter, after tying it below the point of injection. The ligature was removed after the injection had been made and the wound in the abdominal wall, which had been made with antiseptic precautions, was closed. Some of the animals so treated died in from twelve hours to four or five days, while others survived and were killed on the seventh and ninth day.

The left kidney, especially in the cases which survived the operation for several days, was found to be two or three times as large as the right and to present all the evidences of parenchymatous inflammation. The pelvis of the kidney contained more or less ammoniacal urine, pus, and bacilli; the parenchyma gave evidence of diffuse inflammation and contained numerous bacilli. As a rule a pure culture of the bacillus coli communis was obtained from the inflamed kidney.

A similar experiment was made with a species of proteus (vulgaris?), and with a similar result. The animal died at the end of two days. The left kidney was twice as large as the right, the surface of a deep-red color dotted with numerous white spots; the parenchyma had a striped appearance on section and a greenish color in the vicinity of the pelvis, which contained ammoniacal and bloody urine. A putrefactive odor was given off from the organ. Proteus in pure culture was recovered from the interior of the kidney.

Another rabbit received in the same way an injection into the ureter of a bouillon culture of staphylococcus pyogenes aureus. The animal died at the end of forty-eight hours. A fibrinous inflammation was found at the point of injection and the left kidney was about twice as large as the right. The capsule was easily detached and the surface was of a deep-red color dotted with small white foci of infection, which also existed throughout the organ. The pelvis contained thick reddish-colored pus. Staphylococcus aureus was recovered in cultures from the kidney and from blood taken from the heart.

Schmidt and Aschoff say that the changes found in the kidneys of rabbits after the injection of bacillus coli communis into the ligated ureter correspond with those seen in the "surgical kidney" of man. They were surprised at the rapidity with which the bacilli penetrated the urinary tubules. The first changes in the parenchyma of the organ occurred at the end of thirty-six hours, and at the end of five to seven days these changes had reached their extreme development. They evidently depended upon the invasion of the urinary tubules by bacilli. This conclusion corresponds with that reached in previous researches by Albarran,[1] Achard and Renault,[2] and by Krogius.[3] According to

[1] Thèse de Paris, 1889.

[2] Sur les rapports du b. coli comm. avec les b. des infections urinaires. Soc. de Biol., 1891, p. 830.

[3] Recherches bactériologiques sur l'infection urinaires. Helsingfors, 1892.

Schmidt and Aschoff, some of the earlier observers have described non-liquefying bacteria obtained from the bladder in cases of chronic cystitis or of pyelonephritis following cystitis, which correspond in morphological and biological characters with bacillus coli communis, and were no doubt identical with it. They believe that the bacillus described by Clado[1] (1887) under the name of "Bactérie septique," and subsequently found by Albarran and Hallé[2] in forty-seven out of fifty cases of cystitis (fifteen times in pure culture), and called by them "Bacille pyogène," is in fact the bacillus coli communis.

The elaborate researches of Rovsing[3] upon the bacteriology of chronic cystitis were published in 1890. Thirty cases were studied, with the following results: In one case diagnosticated as cystitis no bacteria were found; in three cases culture experiments gave a negative result, but the tubercle bacillus was found in the urine by microscopical examination—in these cases the urine was strongly acid; in twenty-six cases the urine was ammoniacal, and in all of these bacteria were found—usually but a single species. All of these grew in the usual culture media except the tubercle bacillus, which in two cases was associated with some other species, and all produced alkaline fermentation in sterile urine when added to it in pure cultures. The following species were found: Tubercle bacillus, staphylococcus pyogenes aureus, staphylococcus pyogenes albus, staphylococcus pyogenes citreus, streptococcus pyogenes ureæ (n. sp.), diplococcus pyogenes ureæ (n. sp.), cocobacillus pyogenes ureæ (n. sp.), micrococcus pyogenes ureæ flavus (n. sp.), diplococcus ureæ trifoliatus (n. sp.), streptococcus ureæ rugosus (n. sp.), diplococcus ureæ (n. sp.), cocobacteria ureæ (n. sp.).

Pure cultures of all of these species introduced into the bladder of rabbits failed to induce cystitis, even when injected in considerable quantities. But when retention of urine was effected artificially for six to twelve hours, allowing time for ammoniacal fermentation to occur, cystitis was developed. When the pyogenic species were introduced under these circumstances, a suppurative inflammation of the mucous membrane occurred; the non-pyogenic species caused a catarrhal cystitis. Rovsing records the important fact, as bearing upon the etiology of cystitis, that in twenty of the cases examined the bladder had been invaded by the finger or by instruments prior to the development of cystitis.

Lundstrom (1890) isolated from alkaline urine obtained from patients with cystitis two species of staphylococci—staphylococcus ureæ candidus and staphylococcus ureæ liquefaciens; from albuminous, acid urine he

[1] Deux nouveaux bacilles isolés dans les urines pathologiques. Soc. Anat., May, 1887, p. 339.

[2] Note sur une bactérie pyogène et sur son rôle dans l'infection urinaire. Bull. de l'Acad. de Méd., T. XX., 3e S., Paris, 1888, p. 310.

[3] Die Blasenentzündungen, etc. Berlin, 1890.

obtained streptococcus pyogenes.[1] Krogius obtained from the urine of individuals suffering from cystitis a bacillus which he calls urobacillus liquefaciens septicus. Schnitzler[2] (1890) found the same bacillus, or one very similar to it, in thirteen out of twenty cases of purulent cystitis examined by him. In eight of these cases it was obtained from the urine in pure cultures, and in five it was associated with other bacteria. In twelve of these twenty cases the cystitis resulted directly from catheterization; in the others it occurred in individuals suffering from stricture or from calculus.

When cultures of this bacillus were injected into a vein in rabbits, the animals died in from three to eight days, and in every instance an intense nephritis was observed at the autopsy—twice with the formation of small abscesses. The bacillus was found in the blood and the organs generally. Injections into the bladder of rabbits almost always gave rise to a severe purulent cystitis—large rabbits were selected, and great care taken not to injure the mucous membrane of the bladder. Schnitzler was not able to induce cystitis in rabbits by injecting in the same way considerable quantities of a culture of staphylococcus pyogenes aureus.

According to Schmidt and Aschoff subsequent researches indicate that some of the species described by Rovsing as being new are in fact varieties of bacillus coli communis.

The identification of the bacillus pyogenes of Albarran and Hallé (Bactérie septique of Clado) with bacillus coli communis was first made by Krogius[3] (1891), and about the same time by Achard and Renault.[4]

In twelve cases of cystitis, six of which were complicated with ascending nephritis, Krogius demonstrated the presence of bacillus coli communis, and showed that in its growth in culture media it corresponded with the bacillus pyogenes of previous authors. In a second communication Krogius[5] states that in twenty-two cases of cystitis studied by him he obtained bacillus coli communis sixteen times, and of these fourteen times in pure culture. He also calls attention to the fact that in those cases where no other micro-organism was associated with the colon bacillus the urine was always acid—a statement which is sustained by the subsequent researches of Schmidt and Aschoff. He also gives details with reference to the pleomorphism of this bacillus and differences in the appearance of gelatin cultures from different sources, the growth being sometimes opaque and sometimes transparent. When cultures of

[1] Sur un bacille pathogène trouvé dans les urines pathologiques. La Semaine Méd., 1890, No. 31.

[2] Zur Aetiologie der akuten Cystitis. Centralbl. für Bakteriol., Bd. viii., 1890, p. 789.

[3] Note sur le rôle du b. coli commune dans l'infection urinaire. Archiv de Méd. expér., t. iv., 1892, p. 66.

[4] Sur les rapports du b. coli commune avec le b. pyogènes des infections urinaires. Soc. de Biol., Dec. 12, 1891, p. 830.

[5] Recherches bactériologiques sur l'infection urinaire. Helsingfors, 1892.

this bacillus were injected into the bladder of rabbits and retained by ligating the urethra, an intense cystitis was developed in from twenty to thirty hours. Injections into the ureter gave a result similar to that subsequently reported by Schmidt and Aschoff. The animal died in about two days, and pyelitis, together with more or less necrosis of the renal epithelium, was found at the autopsy. Reblaub[1] (1892) obtained bacillus coli communis in pure culture in six out of sixteen cases of cystitis examined.

In their latest publication Achard and Renault[2] arrive at the conclusion that there are some differences between their "urobacillus" and bacillus coli communis, which they state as follows:

1. Upon most media, especially upon malt-agar, the growth is more luxuriant.

2. Cultures of the urobacillus upon potato appear grayish-white, very luxuriant, and have many gas-bubbles.

3. The urobacillus develops much gas even in gelatine and agar cultures containing little sugar.

Morelle[3] (1872) and Denys[4] (1892) in their bacteriological researches obtained from numerous cases of cystitis a bacillus which they identified with bacillus lactis aërogenes of Escherich. But the last-mentioned author has since stated that this bacillus presents varieties which cannot be distinguished from the typical cultures of bacillus coli communis.

The recent researches referred to having shown that bacillus coli communis is very commonly present in the urine in cases of cystitis, and often in pure cultures, its etiological relation to the disease in question seems probable, and this view is further sustained by experiments upon animals and by the demonstrated fact that retention of urine *per se* does not give rise to inflammation of the bladder. But this is not the only micro-organism which is capable of causing a cystitis when introduced into a bladder which has suffered some kind of mechanical injury or has been subjected to the action of chemical irritants contained in the urine. The researches of Krogius, Schnitzler, and of Schmidt and Aschoff show that next to the colon bacillus the micro-organisms most commonly found in cases of cystitis and of pyelonephritis is a proteus (P. vulgaris?).

At the date of the publication of the monograph of Schmidt and Aschoff the bacillus coli communis had been found in pure culture in sixty cases of cystitis, and the proteus in thirteen cases. The authors named say:

"But two species of bacteria (bacillus coli communis and proteus) have, up to the present time, been demonstrated to be the cause of pyelo-

[1] Des cystitis non-tuberculeuses chez la femme. Paris, 1892.

[2] Sur les bacilles de l'infection urinaire. Compt. rend. de la Soc. de Biol., April 9, 1892, p. 311.

[3] Étude bactériologique sur les cystitis. Lierre, 1892.

[4] Étude sur les infections urinaires. Bull. de l'Acad. Royale de Méd., Louvain, 1892.

nephritis. When, in addition to these, other bacteria or cocci are found, we have a pyæmic mixed infection."

An important point to be kept in view is the fact that when bacillus coli communis is found in the urine in pure culture, this fluid is more or less acid, as the bacillus in question does not give rise to alkaline fermentation, at least not under the conditions found in the bladder and in the absence of retention. But when proteus is present the urine is almost always ammoniacal.

The number of cases of pyelonephritis reported since 1889 by the authors heretofore referred to (Albarran, Rodet, Morelle, Krogius, Achard and Renault, Schnitzler) in which bacillus coli communis was found and was probably the exciting cause of the ascending nephritis, is twenty-nine, and in twenty of these the bacillus referred to was found in pure culture.

Finally, I think we are justified in concluding that cystitis and ascending pyelonephritis are usually caused by micro-organisms introduced through the urethra into a bladder which is rendered susceptible to infection by mechanical violence or chemical irritation. And that the most frequent cause of such local infection is the bacillus coli communis, which is constantly present in the intestine and upon the external surface in the vicinity of the anus, from whence it may easily be transported to the interior of the bladder by catheters, etc., used by the patients themselves or by their medical attendants. According to Bouchard[1] it has been shown that this bacillus is sometimes found under the prepuce and about the vulva of healthy persons, and this is what we should expect from their proximity to surfaces which are constantly soiled with discharges containing it. But there is no evidence that the bladder is reached by the direct invasion of this or other bacteria without mechanical assistance. The researches of Lustgarten and of Mannaberg[2], and of Krogius[3] show that bacillus coli communis is not found in the normal urethra.

THE ABUSE OF TRACHELORRHAPHY.[4]

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The question of the immediate closure of torn cervices I will not discuss in this paper, but will deal only with the operation as applied to conditions which have existed for some time.

[1] Charrin: Sur la bactérie commune des infections urinaires. Soc. de Biol., 1891, p. 851.

[2] Ueber die Mikro-organismen der normalen männlichen Urethra. Vierteljahrsschr. f. Dermatol. u. Syph., 1887, No. 4.

[3] Arch. de Méd. expér., 1892, p. 75.

[4] Read before the American Gynecological Society, Washington, D. C., May 29, 1894.

Trachelorrhaphy is performed for the cure of erosions, cervical hypertrophy, cystic degeneration, sterility, subinvolution, to prevent cancer, and for "reflex symptoms." These are some of the reasons given for doing the operation; there are doubtless others.

Categorically and in detail I will discuss the various lesions for which the operation is done. "Erosions" are found in most cases of purulent endometritis of the nulliparous; are very generally found when purulent endometritis is associated with conditions which enlarge the uterus, as polypi; are often noticed with laceration of the cervix, but are not found with this condition unless there be a purulent endometritis or endocervicitis. The only circumstance under which this cervical folliculitis (erosion) is very generally present, whether associated with the long cervix of the maid or the torn one of the mother, is when there is a purulent discharge pouring over it from above the os internum. We meet with the most liberal tears with great ectropion of the lips, entirely free from folliculitis. But the cervix will not tolerate a flow of pus over it for even a few days without presenting the condition known as erosion. And, filthy as the vagina usually is, if this supply of pyogenic cocci from above be cut off, the simplest treatment suffices to subdue the erosion without trachelorrhaphy.

The cervical hypertrophy so often found associated with bad tears, is caused in two ways: more often it existed largely before labor, and is increased, of course, by pregnancy. But it is frequently the result of long-standing interstitial folliculitis. The most pronounced hypertrophy, without tears, we find in old virgins, an hypertrophy which may be termed strictly "interstitial." The large cervix, I am inclined to believe, more often leads to pronounced laceration and persists in enlargement after the tear, and less frequently will a normal cervix hypertrophy merely because torn. If the incisions of Simpson and Sims accomplished nothing else, they proved that incision of a certain form of hypertrophied cervix is followed by marked atrophy.

Those of us who employ cervical incisions for protracted first stage due to hypertrophy of the cervix never notice that increased growth of the cervix follows the operation, although the incisions are not sewed up after delivery.

It is inconceivable by me why a tissue composed of unstriped muscle, connective tissue, and compound racemose glands, should take on new growth merely because certain of its fibres have been separated in labor, when the very opposite follows the clean incision of the same structure.

The fact that an hypertrophied cervix becomes lacerated in labor, surely does not indicate a necessity for performing trachelorrhaphy. And although the cervical tissue is thrown into an extraordinary activity by pregnancy, and is torn by labor, the indication for operation does not point to trachelorrhaphy as the procedure to be adopted. Whether we

assume that the enlargement of the cervix is due to a new growth, or that it is merely a laceration of a previous hypertrophy, it would appear to be undesirable to again unite these diseased tissues.

Sterility is said to follow laceration of the cervix. It is hardly worth while disproving this statement. Still, it may be well to point out that every woman has her cervix torn at her first labor; and nothing in professional experience is more common than that a woman for some years sterile, bears a child, is lacerated and brings forth regularly thereafter. An interesting form of scientific mind seems to be possessed by those who sew up the cervix for acquired sterility; inasmuch as commonly, the same gentlemen cut open the cervix for sterility in young women. The speculum view of the subject is entirely too limited.

In one case a cervix is too stenosed, and therefore the woman is sterile; in the other it is too open, and again she is sterile—a case of which Mr. Tyndall might term the *un*scientific use of the imagination. The truth of the matter is that the cervix is merely a sphincter muscle, and is purely mechanical in its functions, and so long as its integrity is such that it can properly act as a sphincter and support to the uterine muscle, it is not necessary to unite its separated fibres. I grant that the widely gaping hypertrophied lips we often see are pathological; but they were not natural before the labor. The tear takes place in the cervix already abnormal, and, as a rule, the greater the ante-partum hypertrophy, the greater the necessity for a tear. The standard of a normal uterus is not to be found in the woman of thirty, but in one of fifteen; and hypertrophy of the cervix in the latter, whether after or before she has a child, is not to be expected. The standard must be adopted from that state of the organ when it is in the first perfect establishment of its functions, and not after it has been in disuse for years and has begun to undergo changes.

For no condition is trachelorrhaphy more often performed than for subinvolution. If it is done while the uterus is undergoing its normal involution, if done during the puerperium, hyper-involution is not an infrequent result.

Retarded involution appears to me as the result of causes other than a torn cervix, more especially the character of the labor preceding it. Certainly, in my experience, it is more common to find it occurring after first labors, other conditions being similar, than in women who are multiparous and who have torn cervices. In fact, I have observed cases where it was not present at all until after a trachelorrhaphy had been performed. I must ask the Fellows to remember that at each uterine contraction in labor the corpus is deprived of blood circulation. This occurring many times through an obstructed labor, and probably followed by the loss of much blood, is the cause predisposing to subinvolution. It is this delayed, protracted, first stage, this fatigue of the

uterine muscle, together with a poor general condition, which bring on subinvolution.

We do not find that subinvolution follows Dührssen's incision; and the more open the cervix (lacerated by previous labors) the easier the labor, and easy labors do not conduce to subinvolution. If rupture of the cervix with a profuse hemorrhage and consequent anæmia occurs, subinvolution is prone to result. But it is the difficult labor, the loss of blood, which causes it, and not the separation of cervical fibres.

Cystic degeneration, as it is called, or interstitial folliculitis, more frequently follows as a result of generous cervical tears, for the follicles enlarged by pregnancy more readily inflame after the tissues are torn. The possibility of the occurrence of this condition is a slight argument in favor of immediate closure of a torn cervix; but its presence in a lacerated cervix is a positive contra-indication to trachelorrhaphy. Cervices the seat of this degenerative condition require a more radical procedure than sewing the lips together. In view of the careful observations made in the very beginning of epithelial infiltration of the cervical tissues, and because of the very chronic, subtle way in which the follicular change takes place in the deeper structures, cystic degeneration assumes a position far more important than one of simple glandular hypertrophy. The most profound questions involved in the histogenesis of epithelioma are suggested by these cases. They demand a very thorough removal of all of the affected tissue, and not puncturing of cysts and trachelorrhaphy.

There are certain women in whom the knowledge of any departure from the normal standard about their genitalia will bring on some form of hysterical manifestation. Almost any operation will benefit them. It is merely a question of suggestion generally.

Briefly and without argument I will state my disbelief in the reflex effects of lacerated cervix, except to a very limited degree. In some women any form of peripheral irritation will establish a more or less severe degree of neuritis; and occasionally a cystic cervix will have such an effect. The removal of the affected tissue is here demanded, and not its union by suture.

I believe that cancer of the uterus is becoming more and more frequent. As the disease is more thoroughly studied, and as the great majority of cases are primarily of the cervix, the belief is becoming pretty general that laceration of the cervix gives rise to it. The fact that negresses rarely have it, although their cervices are very raggedly torn; that bats do not have it; that erect-walking monkeys do not have it, although *their* cervices get torn, has no bearing on the question. These are not subject to cancer anywhere.

That we find cancer of the cervix in women with torn cervices, and not with those with intact cervices, although in both the cervix is at the

junction of the transition of one form of epithelium to another, I will try to explain.

The very life-history of the uterus is one of sudden onsets of developmental activity and equally sharp retrograde processes. The unimpregnated uterus is in an embryonic state. Cancer with the parous woman is more common, because in her only does this embryonic cervix, on the border of transitional epithelium, spring from the embryonic condition to that of complete functional activity and mature growth. It occurs less frequently with the maid, merely because her corporal uterus, and never her cervix, imitates at the menses what takes place with the parous woman. Thus it is, that when the nulliparous woman has cancer it is in that part of the organ which has mimicked the parturient uterus, and not in the quiescent cervix. It is not during the periods of greatest activity that we find cancer most often developing, but it is when the final retrograde metamorphosis is beginning. I believe that the phenomena of development and involution incident to pregnancy are much more prominent in the causation of cervical cancer than are the tears which invariably follow labor. The great part which functional activity with periods of repose plays in causing cancer is well shown in the preponderance of mammary cancers in women who have nursed. Or will the advocates of local irritation as a cause of cancer say that the cracked nipples which nursing women have cause their cancers?

In the years of greatest activity among New York surgeons in performing trachelorrhaphy I have collated statistics:

	Per cent. female deaths from all cancers.	Per cent. female deaths from cancer of organs other than uterus.	Per cent. deaths from cancer of uterus.
1881	2.57 per cent.	1.61 per cent.	0.96 per cent.
1887	3.09 "	1.94 "	1.15 "
1893[1]	3.00 "	1.90 " (estimated)	1.10 " (estimated)[1]

Surely in 1893 the good effects of literally the thousands of preventive trachelorrhaphies which in the preceding twelve years had been performed should be shown; but, on the contrary, cancer of the uterus is increasing. It is not from our case-books that we should compute the results upon cancer of this operation, but from the statistics prepared by so careful a registrar as Dr. Nagle.

[1] The total per cent. female deaths from cancer in 1893 being three, and the ratio of deaths from cancer of the uterus and from cancer of organs other than of the uterus being known for other years, the two classes were in this way estimated. It may be that there is a possible error here, but the great apparent fact is that in twelve years cancer in women has increased almost 0.5 per cent.

In the period mentioned, Dr. Emmet's teaching was generally adopted in New York, and every one, even general practitioners, sewed up torn cervices. I do not think we may justly ascribe cervical cancer to a torn cervix. The disease is one of the curses of our civilization and of our white race. Not by seeking for it local causes can we expect to check it, but by a critical study of every condition under which the disease occurs may we hope to arrest its inheritable tendencies.

Women who have by heredity a tendency to cancer should remain sterile, inasmuch as repeated childbirths more than anything else conduce to it and disseminate it. If we operate to *prevent* the possible occurrence of cancer in those who may reasonably expect it, assuredly trachelorrhaphy is not indicated, but a more radical procedure which will remove the entire cervix.

A pathological laceration of the cervix, requiring trachelorrhaphy, I would define as any laceration which is of such severity and degree as to implicate the circular fibres of the cervix sufficiently to cause a modification in shape or position of the uterus. A tear to do this must sever most of the sphincter fibres of the cervix at one or more points. The lesions found associated with the laceration of the cervix I deem best treated by either a curettage of the uterus or by some form of amputation of the cervix which provides for the maintenance of a cervical mucous membrane. And usually it is well to combine the two operations in conditions demanding the latter.

Trachelorrhaphy I would limit to the immediate operation for hemorrhage, and to those cases of tear through the cervix from internal os out to the vaginal junction, cases of true extra-peritoneal rupture of the uterus.

Common to all mammalia is the uterus. In all its function is the same. In shape, in size, it varies greatly in the several species of animals. As the conditions of life under which the various individuals live differ, and as there is a wide range in physical conformation, so in sympathy with these influences do we find variations in the shape of the uterus. Certain general propositions may be stated as bearing upon our subject. Quadrupeds and other mammalia which habitually maintain a horizontal position have a very soft uterine muscle, rich in lymph streams, and no cervix worthy of the name. The uterus rests upon the pelvis or anterior abdominal walls, and does not require much density of tissue to preserve its shape and position. In those animals which have a true cervix, lacerations of that structure have been noticed. In certain of the quadrumana, the cervix is not only torn in labor, but erosions are found and papillary excrescences. These animals have a stout uterine wall, like the human. Woman has a cervix and a thick uterine muscle, because the position of the uterus and its shape (pregnant and empty) must be maintained by the integrity and strength of its walls. Provision

is also made against the premature escape of the fœtus by furnishing her with a cervix. So it is with those animals which habitually assume the erect posture, even our common bat. And because of the excess of connective tissue, these uteri are comparatively sparsely supplied with lymphatics. Therefore the blood of the menses and rut is discharged externally, in labor the cervix is torn, the placenta is expelled, and there is a post-partum lochial discharge.

In other mammalia the rule is that there is no tearing of the os tincæ, the blood of rut, the placenta, and the decidual tissues are absorbed. We have seen that more or less tear takes place at all first labors in women. Already the fact must be suggested to you that surely a certain degree of laceration of the cervix is physiological. Were the cervix capable of simply stretching to allow the escape of child and placenta, in but a few hours would its elastic fibres contract and retention of the lochia ensue with toxicosis. I can but believe that Nature has intended this lesion as a safeguard. In seeking general laws applicable to woman we must not consider physical woman in her present condition of refinement and mental elevation. Not for such surroundings and condition has she been given a certain physical conformation. But as a primitive creature, living in unclean surroundings, bringing forth in early youth, dependent solely upon her own physiological forces for protection against destruction of her procreative organs, has Nature made her uterus.

Laceration of the cervix is a lesion common to woman and to many animals. It is not the result of misguided Nature, but it is one of her beneficent acts to protect the life of the individual and to insure propagation of the species. When our modern woman so far advances that she will cease to discharge her placenta, that she will cease to have a lochial discharge, she may have all tears in her cervix united. Until that time arrives, she has need for a lacerated cervix; it is essential to her safety.

Further, if she will bear her first child while she is yet in the formative stage, at sixteen or seventeen, what laceration of the cervix takes place at that first labor will be sufficient for all subsequent labors, and will not be pathological, inasmuch as it will occur before the uterine muscle has atrophied and before the cervix has markedly increased in size.

But inasmuch as the cultured woman delays childbearing until she is near the middle of her menstrual life, living and dressing unnaturally, she conceives with a degenerate uterine muscle, with a rigid, and often hypertrophied cervix. In such a woman labor must be tedious and difficult. She is very prone to suffer a pathological laceration of the cervix, or to have established some one of the conditions I have described. Her life and her labor have been unnatural. It is not necessary that the false reasoning so pervade our science that we err in performing an operation for a lesion which is due to her unnatural life, perhaps, but

which is often the means of saving her from infection. Remove from the life and puerperium of even our high-bred women the elements of septic and specific infection, and even with their distorted uteri, the conditions I have spoken of, as well as more serious ills, will not so often be found associated with the inevitable cervical tear. But when found, pray let us have the proper conception of their causes and significance, and apply to each its indicated procedure.

Emmet's teachings have been so misapplied that now a condition which is natural to the mother is considered pathological, and is subjected to operation. When the cervix uteri is so far advanced in disease as to require an operation, I do not believe trachelorrhaphy the preferable procedure. When the laceration is of such degree that a cosmetically perfect cervix can be secured by trachelorrhaphy, I do not consider any operation necessary. Erosion after labor requires the same treatment as in the virgin.

Hypertrophy in the parous woman needs the operation applicable to hypertrophy in the nulliparous. And those other conditions of the cervix which follow labor, whether associated with a slight or a severe laceration, necessitate the removal of more tissue than trachelorrhaphy secures. The great objections I have to trachelorrhaphy are, that it does not give a cervical canal of dimensions equal to the requirements of a woman, who should, as she gets older, bear each successive child with greater ease and security than the preceding; it does not remove sufficient tissue where operation is indicated; and it does not appeal to me as a rational procedure, believing, as I do, that most of the cases subjected to it, require no operation whatever on the cervix, inasmuch as a generous laceration is normal and necessary.

The marvel is that, seeing all mothers have torn cervices, we have not before sought the reason. The indications for performing the operation constitute the measure of its limitations, and from them may be deduced its abuse.

HYSTERECTOMY IN BILATERAL DISEASE OF THE APPENDAGES.[1]

By Florian Krug, M.D.,
of New York.

The Hegar-Battey operation of years ago gave us results which, in view of our utter ignorance of all that related to disease of the appendages, seemed startling and most gratifying. But this operation, though legitimately applied by surgeons, yet, because of its first furor, created in the minds of the less skilled an entire misinterpretation of its limita-

[1] Read before the American Gynecological Society, Washington, May 29, 1894.

tion, and was subjected to the grossest possible abuse. To such an extent was this carried that the operation was brought into entire disrepute. From this extreme point of abuse we have come back to a just estimate of the value of the operation, and are able fully to measure all that it accomplishes and all in which it fails. And, whereas the original operation is rarely performed upon the indications first laid down for it, yet, at least, it has pointed out to us the way for a proper adaptation of practically the same procedure under more precise and more limited indications. Until we had this operation the teachings of Bernutz were lost; but fully appreciating the operation, and, still more, the failures of its first application, the more accurate pathology of Bernutz showed us the true scope of the Hegar-Battey operation. Thus it is, while discarding this operation absolutely, we must yet accord it the credit due, as a step in the proper treatment of the diseases under consideration. And although this new application of the Hegar-Battey operation to the treatment of purulent diseases of the adnexa seemed to us to be about all that we could expect, yet in the light of the surgery of to-day, and a more precise analysis of the results of this further differentiation of the original operation, we are brought to the decision of considering it wholly unsatisfactory. Primarily, it seemed to be health- as well as life-giving, but although the patients were cured of the grosser and more acute lesions and symptoms, yet, to-day, we find that the ultimate results have not consummated our hopeful expectations. And although we are not content with these ultimate results, yet must we consider them glorious compared with the treatment of neglect, based upon the cellulitis theory of the cause of these lesions. Life has been saved, to be sure, but not so often has health been restored as we expected, and as might be desired. The cause of this failure to symptomatically cure these patients lies in an extension of the inflammatory conditions beyond the grosser lesions made manifest by our cœliotomy. Did the removal of these gross but secondary lesions cut short the symptoms, or did we not by their removal leave the essential and primary cause of all the trouble, together with the less apparent, but more fruitful source of suffering, the inflamed uterus, and its nerve centres? I unhesitatingly answer, Yes.

We are now in a position to justly, as well as accurately, estimate the benefits derived from the old operation of removal of bilateral purulent disease of the appendages; and we are also able to say in how far that operation has failed. Careful observation, devoted to cases through some time, demonstrates that while pathologically they are cured, but few are symptomatically relieved. The cause of the failure to accomplish all that might be desired, so far as the subject of the operation is concerned, lies in our failure to remove the original and persisting source of infection. The question has simply resolved itself

into this: that either the cases operated on by those who claim that the uterus, when left, is not a cause of further symptoms and may be rendered innocuous by mild treatment, are not thus cured, or else gentlemen making these statements have submitted to their skill the most simple cases, as a rule, and in the severe ones have failed to observe the results of their work. The cause of continuance of distressing symptoms is the primary lesion in the diseased uterus; the effect of the premature and artificial menopause upon the sympathetics; the irregular and delayed involution of the uterus; the adhesions formed between the intestines and raw surfaces in the pelvis; the possibility of repeated reinfections of the uterus; the possibility of ventral hernia, owing to the different methods of drainage; and many other lesser lesions, together with malpositions natural to the uterus repeatedly inflamed and deprived of its natural supports. Broadly stated, a continuance of the symptoms is due to a retention of the inflamed uterus, which is the primary seat and original cause of every lesion found in these cases, and the effects of its continued influence upon the pelvis, lymphatics, and nerves.

Observations of the results of my own operations and those obtained by the old method, made me eager to grasp any possibility of obtaining better, more speedy, and more permanent relief for these women from the one great subjective symptom, *pain*.

In 1890, having removed many cancerous uteri *per vaginam* with absolutely uncomplicated recoveries, a case presented with bilateral suppurative disease of the adnexa and a large retroflexed uterus. Curettage, salpingo-oöphorectomy, and hysterorrhaphy were contemplated; but the excellent results obtained from removal of the uterus and adnexa in cancerous cases suggested to me that, inasmuch as the woman had to be castrated, why should I not remove the diseased uterus also. This I did. The remote, as well as the immediate result, was perfect. The severe criticism following the report of this case, and the timidity incident to my conscious fallibility, forced me to resume the old routine and generally practised operation. But this one case had left upon my mind an impression and a brilliant picture. During this period of my relapse from the proper procedure in these simple suppurative cases, I removed many fibroids having purulent adnexa. The contrast was unavoidable between the results obtained by ablation of the fibroid uterus with bilateral suppurative tubal disease, and those which followed removal of these tubes and retention of the inflamed uterus. In both classes the uteri were diseased; and the belief came to me that the difference in immediate as well as remote results was due, *must be due*, to the retained uterus in the latter class.

In September, 1892, I again removed a uterus, associated with bilateral suppurative tubo-ovarian disease, selecting the abdominal route rather than the vaginal, for reasons to be presently stated. At this time I was

yet undecided as to a routine practice in these cases; and while adopting the old method in some, and the more radical in others, I was enabled to compare the result in the two classes. And this contrast was made more marked by the fact that cases presented themselves to me on whom I had previously removed bilateral suppurating adnexa, with a persistence of most distressing symptoms, and who were entirely relieved of all symptoms when I, by a secondary operation, removed the uterus.

Such a study substantiated me in the belief, and confirmed me in the method I now employ, of, in every case demanding the sacrifice of both adnexa, removing the uterus also. The following reasons appeal to me why the uterus should be removed in these cases:

The uterus without the adnexa is a useless organ, and devoid of physiological function.

It is not innocuous; it is, on the contrary, positively a diseased and therefore harmful organ.

Histologically, the tubes are but parts of the uterus, and their removal is partial amputation of the uterus; therefore, why should we not go a step further and remove the rest of the diseased organ?

Is it conceivable—clinically, is it a fact—that those projections of uterine tissue which we call the tubes are *alone* diseased, and not the rest of the uterus?

This question is pertinent and forceful when it is known that the primary seat of the disease is the uterine cavity, and that the tubes are involved by direct continuity of tissue. Although in the last few years the indications for drainage have, under a more perfect technique, become limited to a very small class of cases, still there are those which demand drainage in a *surgical* sense. What route for this drainage more proper than the one Nature has provided for the lochia and other physiological discharges?

Leaving the uterus merely invites future infection; and it may be, I think, fairly stated that a woman who has contracted gonorrhœa from husband or lover will again be subjected to the same exposure after her tubes are removed. And although we may, for argument, grant all that those who practise the old operation claim for it, yet, surely, these will assent that removal of the uterus relieves the woman from the possibility of further contamination of this organ. Careful observation and questioning of my patients has elicited the fact that the artificial menopause is much easier for the woman who has had her uterus removed, whether for cancer, for fibroid, or when associated with disease of the adnexa, than when the tubes alone are removed. The explanation of this lies in the fact that when we remove the uterus we remove the great mass of ganglionic tissue in the organ.

Did this operation involve an increased danger to the woman some objection might be made to it; but it does not. On the contrary, it

lessens the mortality in the hands of those familiar with the technique of hysterectomy. In its performance it takes no longer than the admittedly proper procedure of curettage preceding a cœliotomy, and some less time than to attach a proper drain where drainage is demanded, or to do a hysterorrhaphy. And when we consider the possible necessity for a secondary cœliotomy to remove a uterus for persistence of symptoms, or to close a hernia following drainage, the argument for the complete piece of work in the first instance becomes still more powerful. My objection to the vaginal route in hysterectomy is, that when once begun it must be completed, and the operation does not admit of a clearer estimate of the disease of one or the other adnexa, and possibly some conservative procedure.

Were I addressing a society of those not skilled in abdominal surgery I might not dare to advocate for their adoption this complete operation, but would advise some palliative procedure. But my apparent boldness is born, not of a disregard for what the operation embodies, but belief in a just and proper estimate of the incompleteness of the old method and the completeness of this. That I may not be misunderstood, in closing I will emphasize the fact that I am dealing only and solely with those lesions of the adnexa which unquestionably demand the removal of the adnexa where both are the seat of disease precluding the possibility of cure by all conservative methods.

AMPUTATION OF THE ENTIRE UPPER EXTREMITY (INCLUDING THE SCAPULA AND CLAVICLE) AND OF THE ARM AT THE SHOULDER-JOINT.[1]

With Especial Reference to Methods of Controlling Hemorrhage. With a Report of One Case of the Former Amputation and Four of the Latter.

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In this paper I shall consider, first, amputations which allow of simple disarticulation at the shoulder-joint itself; secondly, those cases in which the axilla is invaded, yet to such an extent as to allow of its being thoroughly cleaned out, followed by amputation at the shoulder; and, thirdly, those cases in which the parts are so far invaded as to necessitate the removal of the entire upper limb anatomically, that is to say, including the removal of clavicle and scapula.

[1] Read before the American Surgical Association, Washington, May 29, 1894.

I. SIMPLE AMPUTATION AT THE SHOULDER-JOINT, THE AXILLA NOT BEING INVADED. All surgeons who have performed this operation know that the control of hemorrhage is the key to the situation. I have not had the leisure to make a statistical research into the percentage of recoveries since the introduction of antiseptics, but in a modern amputation at the shoulder-joint the surgeon has a right to expect recovery in the vast majority of cases, provided that the hæmostasis and the asepsis are perfect. The want of accord among surgeons as to the best method of preventing hemorrhage during the operation, and the improvements which have of late been introduced, warrant a reconsideration of the question.

The methods for the prevention of hemorrhage fall into two categories: 1, methods applicable to the subclavian vessels; and, 2, methods applicable to the axillary vessels.

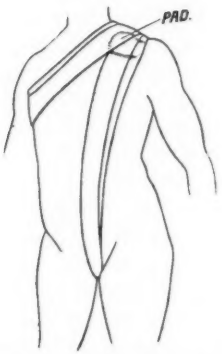
1. *Subclavian methods.* *a.* In most text-books the method advocated is that of compressing the subclavian by the thumb or by a well-wrapped key. "I am of opinion," says Jacobson,[1] "that the more the surgeon trusts to this plan solely, the more often will he have cause to regret it. Pressure, however well applied at first with the thumb, aided by a padded key or a weight, is too often rendered uncertain by the necessary changes in position of the limb during the operation, or in the pressure of assistants, a violent gush of blood at the last showing the surgeon that his confidence in the artery being secured is misplaced. Furthermore, an assistant so used is necessarily much in the way of others aiding the surgeon." The opinion thus expressed is precisely my own—formed not as a theoretical conclusion, but after experience and observation, both as an operator and as an assistant who has endeavored, too often unsuccessfully, satisfactorily to compress the artery. In a recent case of Dr. Hearn's, Dr. Allis suggested and practised a modification of this method, which I think of value. The two chief reasons for the want of success of the method are: first, that the assistant gets tired and makes inefficient compression; and, secondly, that his fingers or the key slip from the proper place. Dr. Allis effectually controlled the artery by wrapping the end of a stick about eighteen inches long with some sterilized gauze, and then holding the pad so made in position with his two hands, while compression was made by the weight of his body against the end of the stick, thus overcoming the objection of fatigue, and the retaining of the stick by the fingers was very effective. This method, however, in view of what I shall say later, should, in my opinion, be used only exceptionally.

b. In the *Annals of Surgery*, July, 1890, and again in a later communication (*N. Y. Medical Journal*, July 4, 1891, p. 27), I published another method of compressing the subclavian. (Fig. 1.) In this I proposed that a wooden or a pure rubber pad should be placed over

[1] Operative Surgery, p. 117.

the artery and kept in position by an Esmarch bandage, beginning at the pad and passing down the back and under the perineum, then over the pad and around the sound axilla, alternating the two turns, thus both making compression on the artery and holding the pad firmly

FIG. 1.



Keen's method of compressing the subclavian by a pad and Esmarch's bandages.

in place. I have tried this method in the following instance, but found it unsatisfactory and abandoned it in favor of compression of the subclavian, as the patient was a child.

CASE I. *Amputation at the shoulder-joint for extensive burn of the arm; recovery.*—Mary C., of Morrisville, Pa., aged nine years, was sent to the Jefferson College Hospital, on February 20, 1892, by Dr. Groom, of Bristol, Pa. On the 4th of July, 1891, while playing near a fire, her dress caught fire and she was badly burned. The left arm and forearm, excepting a little patch on the inside of the upper arm, were burned from shoulder to wrist. On her left thigh was another large burn and another on the abdomen. After prolonged treatment by Dr. Groom the abdominal wound healed, but the entire arm from shoulder to wrist was one large ulcer, excepting just above the inner condyle; and on the left thigh was another ulcer eight by four inches. For the arm nothing but amputation at the shoulder-joint would answer, not only on account of the size of the ulcer, but because the tissues had been burned entirely to the bone and there was no possibility of recovery of motion.

Operation, March 30, 1892. I attempted first to control the hemorrhage by a supra-clavicular pad of pure rubber gum and an Esmarch bandage, but not being able readily to adjust it, I abandoned its use, and Prof. Brinton compressed the subclavian over the first rib. The granulation tissue resulting from the burn stretched to within two inches of the acromion on the outside and within two and a half inches of the axilla on the inside. On the outside, therefore, I was compelled to utilize one and a half inches of this granulation tissue for the deltoid flap. I used an ordinary bistoury, first cutting a deltoid flap from with-

out inward, and then an axillary flap. The vessels were then tied, and the flaps united with a drainage-tube. During the entire operation the child lost not over four ounces of blood. She reacted well and had no vomiting.

On the day after the operation her temperature rose to 103.6°, and two days later to 104°. By the fourth day, however, it had fallen to the normal and remained practically so afterward. Primary union took place between the flaps, but the deltoid flap and a very small portion of the axillary flap still consisted of granulation tissue on the external surface. On the night of April 27th, her temperature having been perfectly normal, a fire in the neighborhood of the hospital caused great excitement in the wards and sent her temperature up to 105.4°. It fell, however, to 99° by the next day.

On May 12th her brother and herself were both etherized, and I transferred some skin-grafts by Thiersch's method from her brother's thigh to her own, and also to her shoulder. These at first did well, and for three weeks it looked as though the ulcer would be entirely cured, but then the grafts melted away almost entirely. She was discharged on June 14, 1892, with the ulcers in a good condition.

April 3, 1893. The child returned for inspection, and I found that the ulcer on the shoulder-joint was entirely healed, and that on the thigh was reduced to a small ulcer, two by one and a half inches, and was still slowly healing. The skin-grafting seemed to stimulate the wound toward an earlier healing than would otherwise have resulted.

May 1, 1894. She writes me she is in excellent health, the ulcers being healed.

That the method has, however, a place in certain cases in which manipulation *in the axilla itself* is necessary, as in wounds of the axillary vessels, is shown by a case which I quoted[1] in which the late Dr. Charles T. Parkes used it with great advantage. In fact, the operation he did could hardly have been done by any other method. Still, upon the whole, I regard the method as inferior to Wyeth's (*vide infra*).

c. Prior ligation of the subclavian artery. This, of course, is effectual. It has, however, in my mind three objections: First, it adds a second serious operation, and so prolongs the time required for the amputation at the shoulder; secondly, the ligation of the vein is practically impossible without resection of the clavicle; thirdly, if the vein is not ligated there is always the serious danger of the entrance of air during the operation—a danger more than once realized.

2. *Axillary methods.* These may be divided into two categories: *A*. Methods in use prior to the introduction of Esmarch's tubing, and *B*. Different methods of using Esmarch's rubber tubing.

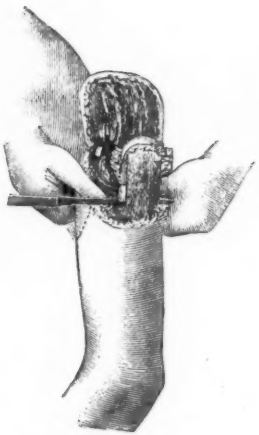
A. Methods prior to Esmarch's elastic tubing.

a. Compression of the inferior or internal flap by the fingers, which seize the vessels before they are cut. It is too familiar to all sur-

[1] New York Medical Journal, July 4, 1891, p. 27.

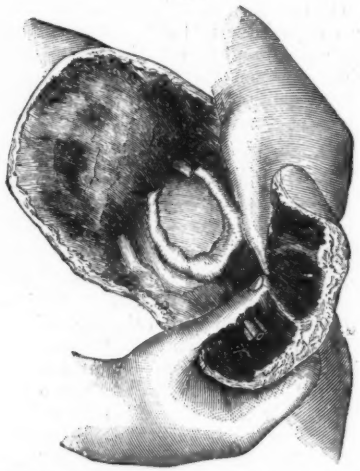
geons to need a description. Figs. 2 and 3 illustrate it. This is one of the best and most reliable methods, but has the objection that it

FIG. 2.



Digital compression of the vessels before cutting the internal or vascular flap. (JACOBSON.)

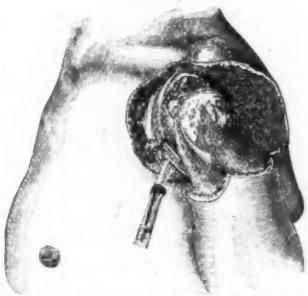
FIG 3.



Digital compression of the main vessels in the vascular flap after disarticulation. (JACOBSON.)

does not arrest the hemorrhage from all the bloodvessels, but only the main ones, and also that it requires an assistant, who is more or less in the way. It requires a very reliable, cool-headed assistant. Next to Wyeth's pins, however, I think this the best method.

FIG. 4.



Seizure of the axillary vessels by hæmostatic forceps before disarticulation. (JACOBSON.)

b. As an illustration of what simple means may be used in emergencies, the method of Harvey[1] may be quoted. Having no reliable assistants,

[1] Indian Med. Gaz., July 1, 1874, p. 190.

he simply covered the end of an office ruler with some lint, and had an untrained assistant compress the artery by pushing the ruler well up in the axilla, and made a satisfactory amputation.

c. Ligation, or seizure of the axillary vessels with hæmostatic forceps before they are cut. (Fig. 4.) This is also a method which does excellent service and is especially to be commended when one has insufficient or inefficient assistance, or in emergencies, as illustrated by the following case:

CASE II. *Amputation at the shoulder-joint for a mass of ulcerating tubercular axillary and subclavicular glands involving the axillary vessels and nerves; death from exhaustion.*—Miss J. P., aged nineteen years, was kindly sent to me by Dr. W. H. C. Smith, of Millville, N. J., and entered the Jefferson Hospital on November 14, 1891. Both of her grandfathers, two uncles, and one brother died of consumption, and another uncle is very ill with the same disease. About two years and a half ago she noticed a small lump just below the right clavicle, which gradually increased in size. About four weeks ago it broke in the axilla, giving vent to a watery discharge. She has never had very much pain in the tumor, except from tight clothing. Shortly after the tumor appeared her feet began to itch, and from the feet the itching gradually spread over the entire body, so that she is now covered with scratch-marks. When the tumor first appeared she weighed 121 pounds, but her weight gradually fell to 99. She has been gaining of late, and now weighs 108 pounds.

Status præsens. A rather delicate girl, with a mass of glands in the right armpit and under the clavicle, nearly the size of a fist. In the axilla is a large, gaping, deep ulcer, with a very foul smelling discharge. Diagnosis: Tuberculosis of the axillary and subclavian glands. I advised that an attempt should be made to remove the glands, as it was clear that there was no tendency to heal, but, on the contrary, that she was steadily getting worse.

Operation, November 18, 1891. An elliptical incision was made over the axillary mass, including all of the diseased tissue. I dissected upward toward the apex of the axilla and toward the vessels and nerves, in order to determine the relation of the tumor to these structures. I found that the vessels and nerves were so completely imbedded in the tumor that it was evidently impossible to remove the mass without sacrificing all these important structures. Accordingly, I determined at once to do an amputation at the shoulder-joint. I first tied the vessels in the axilla, as they were already exposed, and then amputated by Dupuytren's method.

She made a very good operative recovery, but in the second week the tissues began to break down, with renewed tubercular ulceration. Cough set in, and she rapidly wasted and died on December 7, 1891, nineteen days after the operation, from exhaustion. No post-mortem was obtained.

d. I should mention, perhaps, Gross' compressor. (Fig. 5.) Practically, however, this is never used.

e. Furneaux Jordan's method, by making a circular amputation at the surgical neck of the humerus, securing the vessels as in a hip-joint amputation, the bloodvessels having been compressed by an Esmarch

band or other similar method, followed by disarticulation of the upper end of the humerus. The method is not without its advantages, especially in growths or injuries comparatively low down, yet requiring a

FIG. 5.

Gross' compressor.

shoulder-joint amputation, but it is needlessly long and does not seem to me to possess the advantages of the method of my choice, as indicated below.

FIG. 6.

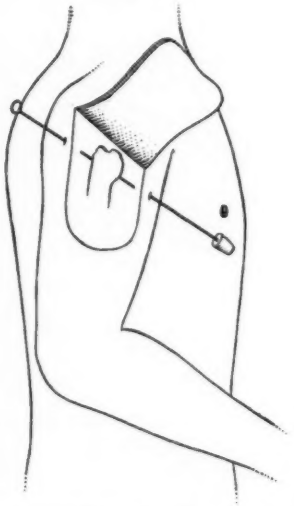
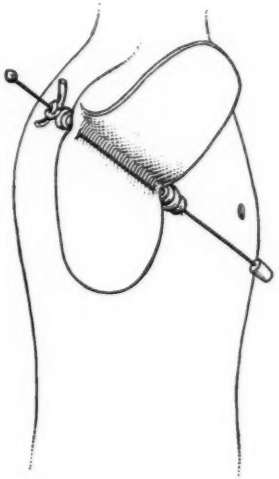


FIG. 7.



Allis' method by one pin through the vascular flap and an elastic tubing around the pin.

B. The four following methods are all based on elastic compression of the vessels by means of rubber tubing, and are varieties of the method of hæmostasis introduced by Esmarch.

a. Allis' method. (Figs. 6 and 7.) After making the antero-external flap, a stout pin is passed through the postero-internal flap, between the vessels and the bone, and elastic tubing wound over the ends of the pin either in oval or figure-of-eight. Dr. Allis' frank statement in his report of a case[1] in which he employed this method shows the difficulty which arose. The vessels retracted above the constricting band and produced a serious and embarrassing effusion of blood into the tissues, requiring ligation of the subclavian artery. The danger of aspiration of air into the vein after the tubing is removed and before the axillary vein is secured, should not be forgotten. This method, so far as I know, was first employed by Dr. Allis in 1890.

b. Esmarch's method.[2] (Fig. 8.) In this method an elastic tube is placed in the axilla and drawn tightly over the shoulder, where it is grasped by the hand of an assistant. It is open in my mind to serious objections; first,

FIG. 8.

Esmarch's method by rubber tubing around the axilla and shoulder.

that the assistant is in the way; second, that he is almost certain to get tired and relax the compression, especially toward the end of the operation, at the very time when the disarticulation is made and the vessels cut; and third, and chiefly, that when the disarticulation is effected, the tubing, not now being held in place by the humerus or by any pin, may easily slip and grasp the flaps, thus obstructing access to the vessels, and in the inevitable confusion of an emergency like this, a large amount of blood may be lost.

c. Moore's method. (Fig. 9.) In 1873 Esmarch[3] published his method of controlling hemorrhage by an elastic bandage and tubing. So far as

[1] Trans. Amer. Surg. Assoc., 1894.
[2] Kieg's Chir. Technik, vol. ii., p. 193.
[3] Berlin. klin. Wochenschr., No. 32.

I know, Moore[1] was the first to utilize it in amputation at the shoulder-joint. His brief report of his method is appended:

"In cases of amputation at the shoulder-joint that have come under my observation I have noticed the chief difficulty of the operation to consist in controlling the hemorrhage attending it, necessitating the aid of a quick and competent assistant. I have twice, in performing this

FIG. 9.

Moore's method by rubber tubing held in place by an anterior bandage.

operation, adopted a method which renders it almost a bloodless one. I lay a piece of calico bandage across the chest and upper part of the shoulder, and then fix an India-rubber cord or tourniquet around the shoulder over the bandage; this effectually compresses the axillary artery. In order to prevent the India-rubber cord from slipping, an assistant takes both ends of the bandage and holds them across the chest.

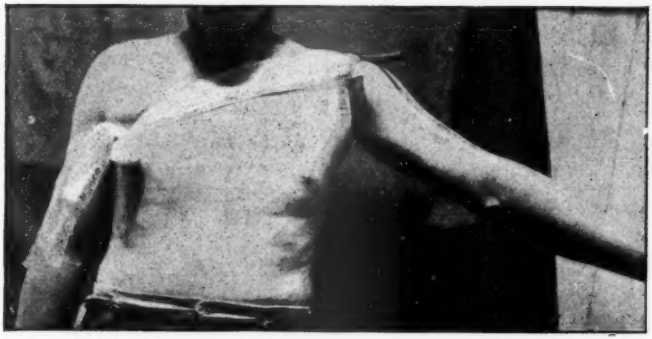
"If called upon to repeat the operation, I would pass a calico bandage under the India-rubber cord, *behind* as well as in front of the shoulder, then tie the four ends together, and thus dispense with the aid of an assistant."

Fig. 10 shows the latter method of preventing the slipping of the tubing by two bandages tied around the body, as suggested but not figured by Moore. In obtaining the photograph, as the tubing was applied on the living body it was wound rather loosely for obvious reasons. It has the advantage of getting rid of an extra assistant, and doubtless holds the tubing well in place. It obviates the piercing of the soft parts by the pins, but the punctures caused by the pins are of no importance practically. The cut of this method showing the tubing held in place by the anterior bandage alone, in Ashhurst's *Surgery*, is credited to

[1] Lancet, 1879, ii. 796.

Stephen Smith, but belongs, I think, to Moore. Smith's own cut is not attributed to anyone.

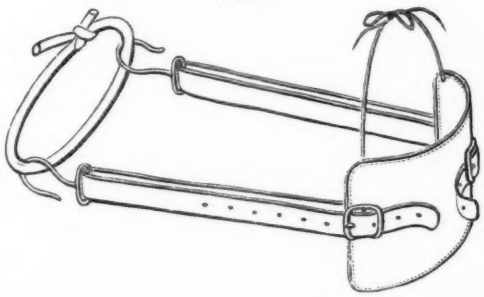
FIG. 10.



Moore's method by rubber tubing held in place by an anterior and a posterior bandage tied under the opposite axilla. (Photographed on the living model by Mr. J. M. Bertolet.)

Dr. G. W. Spencer, one of my assistants, has devised an improved yet simple apparatus for employing this method. It consists of a piece of leather placed under the opposite axilla, and held in place by cords over

FIG. 11.



the shoulder. An anterior and a posterior strap, attached to this axillary leather, hook under the tubing, hold it in place, and can be tightened at will. It is a very efficient means of applying Moore's method. (Fig. 11.)

d. Wyeth's method by pins and the elastic tubing. Mr. Treves[1] says: "The method of controlling bleeding by means of an elastic band, which is carried across the axilla and brought well up over the point of the

[1] Oper. Surg., vol. i. p. 384.

shoulder, is strongly to be condemned as useless and dangerous. In such a method the axillary artery is compressed mainly against the humerus. At the moment of the disarticulation the band is apt to slip. It is in the way of the operator, and cannot with any ingenuity be made trustworthy."

Evidently, as he does not refer to them, he means the use of the band as in Esmarch's method, without any pins or bandage, to hold it in place. If so, his criticism is most just. But I am fully convinced that if any surgeon will try the method as outlined below, he will find such satisfaction in its use that he will abandon all other methods in favor of this. I have assisted my colleague Prof. Brinton[1] twice, and I put on record in this paper two other recent cases, with illustrations of the method. The satisfaction and absolute security that I have had in this very serious operation are such that in an amputation at the shoulder-joint I now feel as confident of my ability perfectly to control the hemorrhage as I do in an amputation of the forearm.

This method may properly be called Wyeth's method, as it is essentially an application of his hip-joint method to the shoulder. In fact, it preceded his method of bloodless amputation at the hip-joint, which was suggested by its prior use at the shoulder. In 1888, in removing the outer half of the clavicle, the glenoid, acromion and coracoid processes, and part of the body of the scapula, he first used the pins and rubber tube.[2]

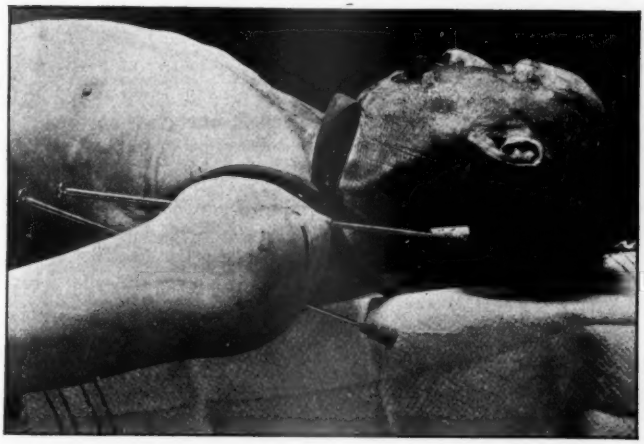
The operation I have performed as follows: The patient is brought to the edge of the table with the shoulder projecting somewhat beyond the edge. The arm is held at a right angle to the body. Two sharp-pointed cylindrical pins, eleven inches long and one-quarter of an inch in diameter near the head (No. 20, French catheter scale) are used. I have found that a good deal of force is required to push the pins through the tissues, and would suggest that the points be made triangular, like that of a trocar, to facilitate their introduction. The anterior pin is introduced through the middle of the anterior axillary fold (tendon of the pectoralis major) at a point a little nearer to the body than what may be called the centre of the fold transversely. The point of emergence of the pin is of much greater importance than the point of insertion; this should be *an inch within the tip of the acromion.* (Fig. 12.) The pin being pushed through, the point is protected by a sterilized cork. The second pin is now introduced at a corresponding point through the posterior axillary fold (tendon of latissimus dorsi), emerging again an inch within the tip of the acromion. Some little care is needed to avoid striking the spine of the scapula. The exact point of emergence is as I have said, important, in order to avoid the precise objection which Mr.

[1] Annals of Surgery, 1893, xviii. 321.

[2] Med. News, Dec. 9, 1893; N. Y. Med. Record, June 24, 1893, and Jan. 13, 1894.

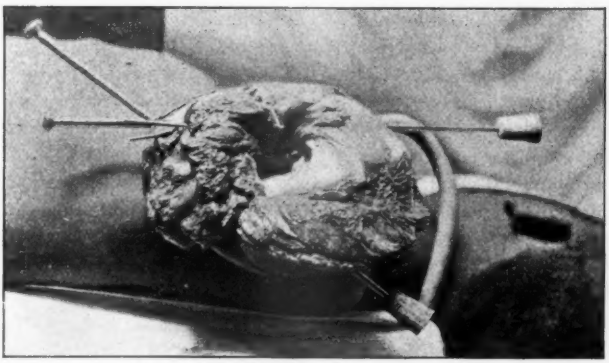
Treves adduces, namely, that if the pin emerges near or at the tip of the acromion, the moment the head of the humerus is removed the

FIG. 12.



Showing Wyeth's pins and the rubber tubing in place. A piece of black court-plaster indicates the tip of the acromion. (Photographed on the cadaver by Mr. J. M. Bertolet.)

FIG. 13.



Showing how complete is the exposure of the inner surface of the flaps and of the glenoid cavity after disarticulation by Wyeth's method. In line with and just below the horizontal pin are two matches in the artery and veins. (Photographed on the cadaver by Mr. J. M. Bertolet.)

tubing is apt to slip downward, compress the two flaps against each other, and thus hide the cavity formerly occupied by the head of the

humerus. The vessels may then retract and bleed freely in this cavity, and being entirely inaccessible except by removal of the apparatus, will require ligation of the subclavian, as in Allis' case, or if the tubing is removed copious hemorrhage will follow before the vessels can be caught. This very difficulty arose in the first case in which I assisted Prof. Brinton, but the tubing slipped down to such a moderate extent that we were able to secure the vessels with little difficulty and after only a moderate loss of blood. In the later operations in which I have used it, and have been more careful as to the point of emergence of the pins, no such complication arose. In one of my recent operations, after the arm had been entirely removed, so complete and perfect was the hæmostasis that I stopped for a moment to photograph the perfectly dry flaps before applying any ligatures. Unfortunately the focussing was not accurate enough to use the photograph, but the fact that I was able to wait and take the photograph shows how complete was the arrest of hemorrhage.

The pins being placed in position, a piece of black rubber tubing half an inch in diameter is then wound tightly around the axilla and shoulder on the hither side of the pins. It is important that this tubing should be the pure black rubber, which is very elastic, and not the far less elastic white rubber tubing. The disarticulation having been effected, the main vessels and all visible smaller vessels are tied and the tubing quickly removed. All other spurting vessels are then seized with hæmostatic forceps. I have not troubled myself to remove the pins until after seizing the vessels, so little have they been in my way. The punctures made by the pins heal quickly and are absolutely of no importance.

That the elastic compression of the vessels is by far the most secure method in all amputations is now, I think, unquestioned. In the limbs this can be secured very readily by the ordinary Esmarch methods, but at the hip and the shoulder the difficulty has always been to retain the elastic tubing in place. The only object of the pins is to hold the tubing in place and prevent its slipping. I feel quite confident that anyone who will adopt the method in the manner above indicated will abandon definitively all other methods in favor of this, excepting in emergencies, which, of course, can never be subject to fixed rules.[1]

The following are two cases in which I have recently done the operation with the greatest satisfaction:

CASE III. *Amputation at the shoulder-joint for osteo-sarcoma of the humerus; recovery; recurrence by general sarcomatosis.*—Miss M. G., aged twenty-three years, was first seen in consultation with Dr. Dercum, who had charge of Dr. S. Weir Mitchell's wards at the Orthopedic Hospital and Infirmary for Nervous Diseases. She had been sent there for supposed neuralgia of the arm. About four months before her

[1] *Cf.* Harvey's "ruler" method.

right arm below the shoulder began to pain her. The pain was so great that she was unable to sleep; this caused considerable loss of flesh. In addition there was marked atrophy of the shoulder muscles. Three weeks before, a small lump appeared on the outer surface of the humerus, barely perceptible to touch. The pain of late has been rather less than it was before, and more intermittent.

Status præsens. June 17, 1893. A slender girl. The right deltoid is markedly wasted and the surgical neck of the humerus somewhat thickened. Vertical measurement from the armpit shows the right side to be three-fourths of an inch and the circumference of the humerus at the surgical neck one and three-quarter inches larger than the other side. Palpation shows a thickening—not now a lump, but a thickening which extended all around the bone as a sort of collar. My diagnosis was an osteosarcoma, and my advice was that an incision should be made in order to verify the diagnosis; and it verified, immediate amputation at the shoulder-joint should be done. This I desired to do at once. Her mother and brother (a physician), however, were so loth to have anything done that I consented reluctantly to wait until five days later.

Operation, June 22d. Since the 17th there has been a distinctly perceptible increase in the thickening around the bone, which confirms me in the diagnosis of a malignant growth. Ether. When lifting her on to the table the nurse accidentally let fall her right arm from a distance of not over four inches, and the humerus was fractured. Wyeth's pins were introduced, the rubber tubing applied, and an incision made down to the bone, which was found to be so soft that the knife easily penetrated it. Larrey's amputation at the shoulder-joint was then done. As little beyond mere skin was taken as possible. The capsular ligament seemed infiltrated and was dissected away with great care close up to the glenoid. The hæmostasis was perfect, not a drop of blood being lost excepting that in the extremity. The vessels were tied and the band taken off. Instantly a large jet of blood showed one vessel which I had not seen, and therefore not secured. It was seized by my thumb and finger before more than an ounce of blood had escaped, and was then secured. A great deal of trouble was caused by the numerous vessels which had to be ligated, requiring the application of thirty-five ligatures. This also was a very threatening feature to my mind, as it showed the vascularity of malignancy. A drainage-tube was inserted and the wound closed.

28*th* (sixth day). Her temperature has never risen above 98.8°. The first night she slept six and one-half hours; last night eight hours; begged for a potato to stay her hunger, and wanted to know when she could sit up out of bed. The stitches were all removed to-day (sixth day), and she was allowed to be out of her bed, the wound having healed by first intention throughout. The drainage-tube was removed at the end of twenty-four hours.

Some cultures were made from the interior of the bone at the seat of the fracture, and Dr. Kyle reported on them as follows:

"From the tubes which had been inoculated, stains showed the presence of numerous bacteria, from which two were isolated, *i. e.*, staphylococcus pyogenes aureus and another which I believe to be streptococcus pyogenes. These destroyed what other germs were present, for by the second inoculation these two alone remained; no cells were found. The pathologist's report as to the nature of tissue and bone, of course, will

determine whether it be malignant, but from a bacteriological standpoint I would say it was osteo-myelitis."

Dr. Charles W. Burr reported as follows on the specimen:

"The arm of Miss B. gives evidence of sarcoma. As you know, Dr. Kyle found the micro-organisms of pus in some fluid from the humerus. I think the explanation is as follows: First, an osteo-sarcoma; secondly, in it a focus of secondary inflammation."

May 10, 1894. In the summer of 1893 the growth returned at both ends of the right clavicle. In the autumn a faithful and persistent trial of the effects of inoculations of the products of erysipelas and the streptococcus prodigiosus furnished by Dr. W. B. Coley, of New York, was made, but though reactions were obtained after some of the inoculations, no perceptible effect on the growth was perceived. During the winter of 1893–94 growths appeared at four points on the head and probably internally. It seems likely that her life will be terminated within the next month.

CASE IV. *Amputation at the shoulder-joint for traumatic neuritis; recovery.*—My object being to record rather the surgical than the neurological aspects, I shall report this case very briefly, reserving the fuller details for another occasion.

Mrs. J., aged forty-three years, was admitted to the Orthopedic Hospital and Infirmary for Nervous Diseases, under the care of Dr. Morris J. Lewis, September 5, 1892. Twenty-two years ago she struck the back of her right hand on a grate between the first and second metacarpal bones. The hand swelled immediately and was very painful. Six months afterward two inches of a nerve are said to have been removed from the back of the hand, but immediately after the operation there was no numbness to touch. The pain became more severe, and gradually a universal neuritis of the entire arm, most marked in the ulnar nerve, set in.

I first saw her in January, 1893. Everything had been done therapeutically, and on January 16th, at the request of Dr. Lewis, I stretched the brachial plexus in the neck. On February 4th, no permanent good having come from the stretching of the brachial plexus, I stretched the ulnar nerve in the axilla, and later, on May 27th, I excised three and one-eighth inches of the ulnar nerve.

Her arm having become absolutely useless, and also a great burden, as she had to carry it around all the time, she begged for the relief which amputation would afford. Accordingly, the pain being still no better, on April 12th, 1894, I amputated the arm at the shoulder-joint by Wyeth's method, with pins and elastic rubber tubing. The flaps were so completely thrown back and bloodless after the disarticulation, that I had ample time to take a photograph of the flaps in order to show how entirely the glenoid cavity and the inner surface of the flaps were exposed and accessible. The stump was so vascular that, although the patient was a slender woman, and with a shrunken arm, forty-eight ligatures were required before the hæmostasis was satisfactory. On the fifth day half the stitches were taken out, and on the ninth day all of them were removed. A drainage-tube was used for forty-eight hours. A slight later infection took place at both ends of the drainage wound, which delayed the definitive healing, but all the rest of the wound was well in nine days after the operation.

May 10*th*. She made a speedy recovery and is much better, although

not entirely cured of her neuralgic pains. In fact, from the start I advocated division of the posterior nerve-roots within the spinal dura, but she has never been willing to have this operation done, and hence the various attempts at relieving her by the operations already mentioned.

II. Amputation at the Shoulder-joint in Cases in which the Axilla is Invaded so High that Wyeth's Pins cannot be Used. In 1812 Delpech[1] proposed to make "an oblique incision extending from the external third of the clavicle to an inch above the inferior border of the great pectoral muscle. We thus discover and can cut, near to its origin on the coracoid process of the scapula, the lesser pectoral. The index finger is then carried through the cellular tissue along

Fig. 14.

Showing the line of the incision between the deltoid and great pectoral muscles. (Photographed on the cadaver by Mr. J. M. Bertolet.)

the serratus magnus muscle, then the subscapular . . . and is used as a hook in order to draw outward the mass of vessels and nerves. The artery is always situated at the anterior part of the mass, is surrounded and, as it were, indicated by the two roots of the median nerve, and nothing is easier than to surround it with a ligature which will embrace nothing else. This process appears to me preferable in that it produces but little injury to the parts, that it leaves a certain space between the ligature and the trunk, and permits temporary compression of the subclavian artery above the clavicle on the first rib." He states that he has only done this operation, however, on the cadaver. Fig. 14 on the cadaver illustrates the site of the incision. With modern antiseptic methods and

[1] Dict. des Sci. Méd., tome i. p. 289.

modern retractors and the electric forehead-light, or even without the latter, this procedure can be employed with much greater advantage than formerly. In addition to this if it is necessary to secure more room modern methods permit us to divide the fibres of the muscles on either side of the incision parallel to the clavicle, and to restore their continuity by suture. The advantages of this procedure are:

1. That it gives us wide access to the axilla, especially to its apex, where the vessels lie.

2. We can determine with ease how far and how great is the invasion of the axilla. If the invasion is so extensive as to make an operation hopeless, we can abandon the operation and the patient recovers within a very brief time.

3. If, on the other hand, it is decided to proceed with the operation, the incision already made not only admits of the ligature of the vessels but also serves as the inner part of the deltoid incision. The vein, of course, should be tied as well as the artery.

I have employed this method once in a case of amputation at the shoulder joint in which a sarcoma of great size had invaded the axilla nearly to the clavicle. Six months have elapsed since then, and the patient is entirely well. (See Case V. below.) The ease with which the operation was done and the paucity of hemorrhage during its performance have commended it to me very seriously. In another case in which I recommended it to the attending surgeon, he deemed it best not to adopt the procedure, but to proceed by the ordinary method, the vessels in the inner flap being compressed by the thumbs of an assistant. A large amount of blood was lost during the amputation at the shoulder, and when the axillary mass was removed, as the second step of the operation, the same vessels were cut again at a higher point, and such severe hemorrhage followed that the patient died shortly afterward. In a third case in the practice of my colleague in the Jefferson Hospital, Dr. Hearn, the incision was made and the dissection was then carried out sufficiently extensive to decide that complete removal of the axillary mass was impossible; the operation was therefore abandoned and the wound was well in a very few days.

The following case illustrates the method, and is peculiar in the cause and duration of the disease:

CASE V. *Amputation at the shoulder-joint for a large sarcoma of the arm and involving the axilla; recovery.*—Miss S. J. G., aged fifty-six years, Christiana, Lancaster County, Pa.; was first seen at the Jefferson College with her nephew, a student in the Jefferson Medical College, November 7, 1893. Her family history is negative. She is a dressmaker by trade, and has never been ill before. Ceased menstruating six years ago.

Forty years ago, when she was about fifteen or sixteen years of age, she cut herself in the palm of her left hand. A short time after this she

observed a lump the size of a grain of corn in the left armpit. This remained stationary for a year or so, and then began to grow, finally reaching the size of a hen's egg. The tumor remained permanently of about this size until September, 1892. It then began to grow rapidly. She consulted a local physician, who advised her to let it alone. Its present dimensions are as follows: circumference, twenty-three inches; vertical diameter, ten inches, from the level of the acromion downward. (Fig. 15.) It extends into the axilla so far that it would be impossible to place Wyeth's pins and the circular elastic tubing sufficiently high to remove all the diseased tissues. Apparently there are no separate glands involved. The tumor is hard and soft in different places, at points

FIG. 15.

Sarcoma of the arm and invading the axilla. (Photographed by Dr. C. A. Weaver.)

almost fluctuating. It is freely movable. The pain has been very slight. Her general health is good. Urine normal; specific gravity 1022; no albumin or sugar. Diagnosis sarcoma.

Operation, Jefferson Medical College Hospital, November 9, 1893. An incision was made from the clavicle nearly to the axilla in the interval between the deltoid and the great pectoral. The muscles were separated from each other, and in order to give more room, some of the fibres of the pectoral were divided. In a few moments I entered the apex of the axilla. I found that the growth had extended well up toward but not to the clavicle, and I was able to ligate the artery just as it changes from subclavian to axillary. The artery lay directly behind the vein in the supine position, and so deep that it could only be reached by ligating, dividing, and turning aside the vein. The incision already made was then utilized in making the deltoid flap. This was dissected away from

the bone, and disarticulation was effected with very little hemorrhage. The vessels which spurted in the deltoid flap and some on the pectoral side were quickly caught with hæmostatic forceps. The glands in the axilla were thoroughly cleaned out. The flaps were then united with silkworm-gut, and two drainage-tubes placed in the wound.

The ease with which the operation was done and the small amount of hemorrhage were most satisfactory. Probably, excepting from the arm, not over four ounces of blood were lost in all. The arm and the blood from it were given to Prof. Coplin for examination.

The drainage-tubes were both removed on the third day. I retained them as long as this because of the very considerable oozing which took place. On the seventh day I removed five of the stitches, and on the sixth day reintroduced the drainage-tubes, for the reason that on the fifth day, although the temperature only rose as high as 101°, infection took place, followed by profuse suppuration. There was considerable odor, and small masses of necrotic tissue came away. Toward the end of the third week I reopened the central part of the wound in part, so as to give freer exit to the pus. The two ends where the drainage-tubes had been soon closed, and the discharge escaped entirely at the middle.

She left the hospital on December 16th, her temperature having been practically normal for nearly two weeks, with a good, granulating wound, all healed excepting at the centre.

Dr. Coplin reports that the growth is a mixed-cell sarcoma, and that there were peptones found in the blood, with a moderate increase in the number of leucocytes.

May 10, 1894. The patient is in good health.

III. Control of Hemorrhage in Cases in which it is Necessary to Remove the Arm, the Scapula, and the Clavicle —the Interscapulo-thoracic Amputation of the French. This formidable operation was first done by Ralph Cumming, a surgeon in the English navy, in 1808, on account of a gunshot injury; in 1830, by Gaetani Bey for an injury by an explosion. The next four operations, all for disease, were all done in the United States: by Dixie Crosby, of New Hampshire, in 1836, for carcinoma; by Twitchell, also of New Hampshire, in 1838, for malignant disease; by George McClellan, in the same year and for the same cause; and by Mussey, in 1845, for a sarcoma. All these first six cases recovered. Since that time the operation has been done with increasing frequency, as our methods have improved and as we have recognized the fact that such an extensive amputation gave a much better promise of permanent cure, especially in sarcoma of the upper end of the humerus.

In the sixth edition of Ashhurst's *Surgery*, 1893, p. 135, are recorded 17 cases in which the upper extremity had been torn off by accidental violence and which terminated favorably, and 89 cases in which these parts have been removed by operation, with 67 recoveries and 22 deaths. To these should be added 14 cases done by v. Bergmann,[1] which all

[1] Nasse: Sammlung klin. Vorträge, Neue Folge, No. 86.

recovered with the exception of one—an extraordinarily favorable showing. Von Bergmann's fatal case was a very remarkable one. He found that the sarcoma had extended through the subclavian vein to the superior vena cava, and to prevent a fatal hemorrhage he resected the sternum and tied the superior cava. The patient died very promptly. Probably there are other cases, but I have not searched for them, as it is not intended in this paper to consider results so much as the methods of dealing with hemorrhage.

The key of the situation here is, of course, as Berger in his capital monograph, *l'Amputation du Membre Supérieur*, 1887, has insisted, is the perfect security of the hæmostasis. The details of the procedure for arresting hemorrhage have varied somewhat with different authors as follows: 1. Simple compression of the subclavian artery. 2. The artery has been compressed after resection of the clavicle. 3. The subclavian has been ligated prior to beginning the amputation proper. 4. The middle half of the clavicle has been resected and the artery tied. 5. Wyeth[1] first tied the artery, then formed his flaps, and when the arm, clavicle, and scapula were only connected with the trunk by the vein and nerves, secured the vein and cut the nerves. This seems to me a very dangerous procedure, as the weight of the arm might easily tear the vein and allow the entrance of air. 6. The artery and vein have both been tied after resection of the middle portion of the clavicle. This seems to be by far the preferable method; its advantages being thus enumerated by Berger:

It absolutely prevents the hemorrhage resulting from division of the axillary artery and its branches.

It diminishes the amount of blood lost during the operation.

It absolutely prevents the entrance of air into the vein, which has been the cause of several deaths.

It permits of a large opening of the space between the upper extremity and the chest by section of the greater and lesser pectoral, and with almost no loss of blood.

And finally it enables us to divide the posterior attachments of the upper extremity (where the arterial circulation is still going on) at the end of the operation.

The preliminary resection of the clavicle and ligation of the vessels is by no means even itself easy, especially in cases in which the disease has invaded the clavicular region, or in which the arm has been torn off and the vessels have retracted. Thus, in a pathological case, Macnamara was unable to find the artery, and in a traumatic case Parise was equally baffled in his endeavors to find the vein. (Berger.)

The steps of the operation may be described as follows:

[1] New York Medical Journal, January 17, 1891, p. 57.

1. The resection of the clavicle. An incision is made on the line of the bone and directly down to it. The soft parts, including the periosteum if it can easily be done, are well separated from the bone largely by a blunt dissection. A retractor or periosteal scraper being introduced under the clavicle, the middle half of the bone is resected obliquely from above downward and outward. It is not necessary, nor even is it best to resect the inner end of the clavicle. In 1837 Mussey did this, with the result that air obtained entrance to the vein—in spite of which, however, his patient recovered.

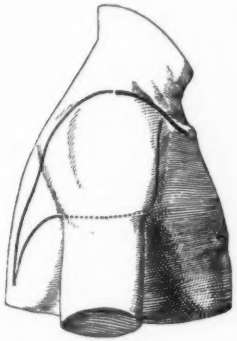
2. Ligature of the artery and vein. As pointed out by Berger and Faraboeuf, it is best to search for the artery just at the point where it becomes the axillary by an incision of the periosteum of the clavicle, if this has been left, and of the subclavius muscle. "In applying the ligature at this level we find a noteworthy landmark in the presence of that branch of the brachial plexus which goes to the great pectoral. This branch is easily seen and still more easily felt with the finger. It passes obliquely in front of the artery, leaves the vein on its inside, and we can easily guide ourselves by the visible and tangible relief made by this nerve, and find at will either the artery or the vein without having recourse to the tubercle of the first rib." (Berger.) In my own case (*vide infra*) this nerve was not seen. It is best, as a rule, first to tie the artery with two ligatures and divide the vessel between them, and then to tie and divide the vein. If this order be followed, the vein is lessened in diameter, its ligation is less difficult, and if it be torn, as happened to me in the case related below, the wound is not flooded with blood, and the vessel can be much more readily secured. If the vein be greatly distended so as to obscure the artery, it may occasionally be best to tie it first with two ligatures and divide it in order to obtain access to the artery.

Should the vein be accidentally punctured or torn, the great danger, of course, is the entrance of air. Instantly the surgeon should cover the aperture with his finger and temporarily secure the vessel by means of hæmostatic forceps. He can then isolate, ligate, and divide it. The vessels being secured, the flaps are then formed. It is best, as a rule, first to make the anterior incision, as that gives us access to the axilla. Division of the greater and lesser pectoral muscles and of the brachial plexus then allows the arm to fall away from the trunk, thus exposing widely the space between the scapula and the chest. Next, the posterior flap is fashioned, the soft parts being rapidly dissected away over the scapula, and the muscular attachments to that bone divided. The bleeding vessels are readily seized by hæmostatic forceps.

The exact mode of making the flaps varies, and must be determined in each case by the character and extent of the disease. The typical posterior incision of Berger (Fig. 16) prolongs that over the clavicle for

its resection and the ligature of the subclavian down to the inferior angle of the scapula. The anterior goes vertically downward between

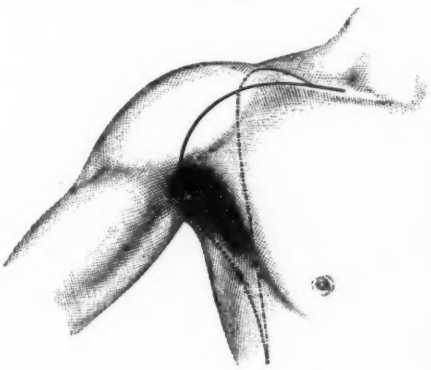
FIG. 16.



Incisions for the anterior and posterior flaps in amputation of the entire upper extremity. (BERGER.)

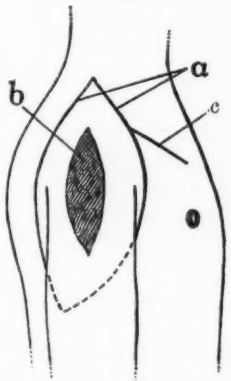
the arm and the chest, opening the axilla, and then meets the other at the inferior angle of the scapula. (Fig. 16.) Somewhat different incisions are given by Treves (Fig. 17), the dotted portions being on the back

FIG. 17.



Incisions for the two flaps in amputation of the entire upper extremity. (TREVES.)

FIG. 18.



a. Incisions for the two flaps in my own case of amputation of the entire upper extremity; *b*. The area of disease. (KEEN.)

of the body. In my own case, as the soft parts above the acromion were invaded, I made a much simpler incision, an oval beginning three inches above the acromion, and passing one in front and the other behind

the shoulder, and meeting in front of the inferior angle of the scapula. (See Fig. 18.) The flaps, if too large, should then be trimmed so that they will adjust themselves snugly to the sides of the thorax. This trimming may be rather frequently necessary, for it is difficult to judge beforehand exactly what should be the size and shape of the flaps. Fortunately, the removal of the clavicle, scapula, and arm leaves so small a stump (if one can apply this term to the rounded border of the chest) that a much smaller amount of muscular and cutaneous flap is required than would at first be thought probable.

As a rule, recovery follows in from two to three weeks. In my own case the stitches were removed on the fifth and seventh days, and the patient was out of bed eight days after the operation. The probabilities are very favorable in my case for permanent cure. Prof. Coplin reported that the case was one of giant-cell sarcoma, and as it had grown very slowly during the four years in which it had existed the probabilities are that the patient will escape any recurrence. In most cases, however, in which the bone is involved, recurrence of the disease has been the rule, but with our later experience it seems to me we ought to get in the future much better results. Observe, first, the low rate of mortality in the more recent operations—one in fourteen of v. Bergmann's. Note, secondly, that we can often amputate wide of the disease in consequence of the relative smallness of the flaps required to cover the chest-wall. Moreover, Thiersch's method of skin-grafting enables us to cover in immediately any moderate defect in the size of the flaps. In view of these facts I would urge, with Berger, that in all cases of malignant disease of the upper end of the humerus, or even of the lower end when it is already diffused, we should not content ourselves with mere amputation at the shoulder-joint, but should at the same time extirpate the scapula and clavicle. This is exactly in line with our modern methods of operation on the breast, in which the armpit is thoroughly cleaned out and a layer of the pectoral muscle removed in order to secure immunity. The very happy and marked increase in the percentage of cures in cancer of the breast should lead us to early and radical operation in cases of malignant disease of the humerus, and still more in similar disease of the soft parts of the arm.

The extraordinary fatality of osteo-sarcomata of the humerus and femur are well known. No one, so far as I am aware, has made a careful statistical investigation of the final results for the humerus, but Borck[1] has found that in eighty-seven cases of amputation at the hip joint for osteo-sarcoma of the femur, *not a single case* can be proved to have been permanently cured. A similar review for the arm would, I fear, show little if any difference from this doleful report. The result in sarcoma of the soft parts is much better. One reason for the frightful

[1] Arch. klin. Chir., xl. 941.

ultimate fatality of osteo-sarcoma which seems to be plausible, and which I believe has not heretofore been suggested, may be found in the physiological fact that the bone-marrow has a share, and probably an important one, in the production of the red blood-cells. If this be so it is possible that by this means the blood may be contaminated at its very fountain, and the disease being thus distributed, metastasis is readily produced, even if the disease has been so thoroughly removed that recurrence *in situ* does not take place.

CASE VI. *Amputation of the arm, clavicle, and scapula for sarcoma of the shoulder; recovery.*—Miss K. M., aged twenty years, of Gettysburg, Pa., was kindly sent to me at the Jefferson College Hospital by Dr. E. W. Meisenhelder, of York, Pa., November 17, 1893. The family history is negative as to both growth and tuberculosis. She has always been in good health until four years ago, when she experienced a constant, dull, aching pain from the right elbow to the right shoulder. The only assignable cause for this was a fall a year earlier, in which she sustained a severe sprain of her right wrist. About a year after the pain appeared the shoulder began to swell slightly, attended with increased pain. The first appearance of the growth was at the insertion of the right deltoid muscle. From this it has gradually extended upward, until it now involves the outer end of the clavicle and the acromion and a part of the axillary border of the scapula. I have spoken of it as a growth, but really it was rather an induration and infiltration of the tissues, with but very little increase in size. It resembles not a little an atrophic scirrhus of the breast. The growth is very hard, almost as much so as cartilage, slightly granular on the surface, entirely immovable, and evidently attached to the bone. The shoulder-joint is also absolutely ankylosed. The pain is constant and severe. At times she has lost in weight, but is now gaining somewhat. Her general health is good. The urine is negative.

Operation, November 20, 1893. The scapula, as well as the humerus, was evidently involved, but how far the scapula was involved beyond its head was uncertain. The acromial end of the clavicle was probably involved, and the soft parts just above the shoulder, extending a little way into the neck, were dense and hard. It was necessary, therefore, to remove the entire upper extremity, including the clavicle and scapula. Berger's typical incisions, starting from the clavicle to form anterior and posterior flaps, would leave on top of the shoulder some of the diseased tissue. The only way in which the disease could be entirely removed, was by an oval incision beginning on the neck and ending near the lower angle of the scapula.

The arm was first bandaged with Esmarch's rubber bandage up to the deltoid insertion, in order to save her all the blood that was possible.

I then made an incision horizontally in the line of the clavicle, exposed the bone, and resected somewhat more than the middle third. I next proceeded to ligate the vessels, the artery first, in order that the arm should not be filled with blood, nor the vein so large and tense as it would be were it tied first, and thus prove an obstacle in reaching the artery. I found the task of ligating the vessels an extremely difficult one. The space between the scalenus anticus and the brachial plexus

was no wider than the artery itself, and access to it was blocked by a large vein, presumably the suprascapular. Finally, however, I secured the artery with two silk ligatures, and divided it. Securing the vein was still more difficult, as it was adherent to the fascia in front. In endeavoring to reach it, a large vein under the inner sawn end of the clavicle tore, and gave me much trouble, but finally, partly by a ligature around the tissues, in which lay the vein, and partly by a ligature which was applied temporarily around the tissues and around the sawn end of the clavicle, in a groove sawed in the bone so as to prevent the slipping of the ligature, I was able to control it. In addition to this, in trying to separate the subclavian vein from the fascia, a small hole was torn in the vein. I appreciated now especially the wisdom of tying the artery first, for had the same tear occurred before the artery was ligated the wound would have been flooded with blood, with all the embarassments which would have attended such an accident. As it was, there was only intermittent hemorrhage, corresponding to respiration. I was naturally afraid of the suction of air into the circulation, and I distinctly heard a slight sibilant suction with inspiration, and saw some bubbles of air mixed with the blood. Instantly I covered the opening with my finger, and soon was able to place a pair of hæmostatic forceps between the tear and the heart. With not a little difficulty I was able finally to surround the vein with a silk ligature. The vein was then tied also beyond the tear, and severed between the two ligatures.

The flaps were then made by two incisions commencing about three inches above the acromion, passing down one over the anterior and the other over the posterior border of the axilla, to a point two inches in front of the lower angle of the scapula. The anterior incision crossed that over the clavicle nearly at a right angle. All the anterior tissues were first cut through, and the nerves divided, when the arm and scapula immediately fell away from the trunk.

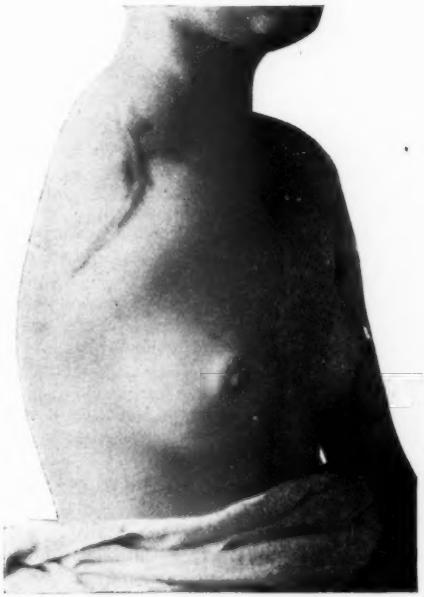
The posterior flap was then rapidly dissected from the scapula, when the operation was easily completed by severing the muscular attachments of the latter bone. No large vessels were cut, but nearly thirty ligatures had to be placed on small vessels, including a few small veins which bled persistently. The flaps came together easily, without trimming, a drainage-tube was inserted at the lower angle, and an abundant sterilized dressing applied.

During the operation she only required one dose of gr. $\frac{1}{20}$ of strychnine, and although the operation lasted nearly an hour and a half (most of which time was required in securing the vessels), she was put to bed in very good condition, with only moderate shock.

December 15th. On the second day after the operation the drainage-tube was removed from the upper end of the wound, and on the third from the lower end, and a little iodoform gauze was inserted in its place. Half of the stitches were removed on the fifth day, and the remainder on the seventh, and she was out of bed on the eighth day. Her temperature only once, on the evening of the operation, reached 101°, and fell to the normal at the end of forty-eight hours. Very slight suppuration occurred at the lower end of the wound, but the whole wound was closed at the end of ten days. On December 11th, three weeks after the operation, a ligature came away from the site in the subclavian vessels. Its discharge was preceded for two days by a little redness, but

no rise of temperature. My impression is that the escape of the ligature was due to necrosis, probably at the end of the vein. Had the ligature been infected it would have created more trouble, of course, and at a much earlier period. I had myself boiled the silk for an hour before the operation.

FIG. 19.



The patient was sent home to-day (twenty-fifth day) with the secondary opening over the subclavian vein almost closed, the rest of the wound entirely well. The photograph (Fig. 19) shows the result. The scar has faded to a marked extent.

Dr. Coplin reports that the growth is a myeloid sarcoma.

May 10, 1894. The patient remains in good health, and is attending college.

REVIEWS.

TUMORS, INNOCENT AND MALIGNANT: THEIR CLINICAL FEATURES AND APPROPRIATE TREATMENT. By J. BLAND SUTTON, F.R.C.S., Assistant Surgeon to the Middlesex Hospital, London. With two hundred and fifty engravings and nine plates. Pp. xvi., 511. Philadelphia: Lea Brothers & Co., 1893.

READERS of Mr. Sutton's former monograph on *Surgical Diseases of the Tubes and Ovaries* have awaited with no little interest the appearance of the present volume, in the expectation that it would contain much that was interesting and original. In this they have not been disappointed, though it must be acknowledged that fewer golden grains can be extracted from the chaff than in his former work. To one who is accustomed to the rigid subdivisions and formal arrangement of the average medical book, Mr. Sutton's collection of monographs on surgical pathology doubtless appear somewhat heterogeneous, but after all, there is a certain charm about a writer whose defiance of the ordinary rules of book-making is justified by the boldness and originality of his thoughts.

The purpose of the present volume is outlined in the introductory sentence of the preface, viz.: "Very early in the practice of my profession I became convinced of the great increase in diagnostic power that results from the combination of pathological and clinical knowledge." Reference is made to the importance of the author's studies in comparative anatomy, and his intention is expressed to exclude from consideration "all those conditions, often classed with tumors, which have been demonstrated to depend on micro-organisms." "The term cancer," he explains, "is employed in a sense equivalent to malignant adenoma, the species being determined by the gland in which the cancer arises."

From this preliminary statement the reader is prepared to encounter certain novelties in the way of classification, etc., which are less evident as he proceeds. A glance at the table of contents shows that the fifty-one chapters (excluding the two concluding ones on etiology and zoölogical distribution) are arranged under four main subdivisions. Under the first group are included connective-tissue tumors; under the second, epithelial; under the third, dermoids (including a rather common nondescript chapter on monstrosities); under the fourth section, on cysts, a wide range of subjects is discussed, from hydrocele to hydatids.

Connective-tissue tumors are divided into twelve genera, which are treated somewhat exhaustively, others in a more superficial manner. The chapter on lipomata is rendered especially valuable by a number of excellent original illustrations. The brief sections on surgical treatment appended to this and to the two succeeding chapters on chondromata and osteomata serve no special purpose, being too general to be of practical value to the reader; indeed they read like foot notes inter-

polated in the text—a criticism which applies to the majority of the corresponding sections throughout the book.

The chapter on odontomata is quite exhaustive, as compared with its companions—a peculiarity of the author's when he discusses a subject in which he is especially interested, even though it leads him to enter into minute details which are more attractive to the special student than to the general reader. To those who are not already familiar with Mr. Sutton's accurate observations in comparative osteology, the chapter furnishes an excellent index of the scientific value of his work.

The chapter on fibromata is rather diffuse, especial attention being given to keloids and molluscum fibrosum. For some reason the usual comment on treatment is omitted.

Seven chapters, or about fifty pages, are devoted to sarcoma, the subject being handled in a thorough and interesting manner, while the accompanying illustrations are especially valuable. The concluding section, on the results of operative treatment, presents an excellent *résumé* of the subject.

Considerable attention is paid to uterine myomata in the chapter on this form of neoplasm, as well as to similar growths developing from the ovary, tubes, and their ligaments. The term fibro-myoma nowhere appears, though in the chapter on fibromata there is a passing mention of the fact that "fibrous tissue often forms a very large proportion of many uterine myomata." Neuromata are carefully studied, a number of rare and interesting cases being cited.

At least a hundred pages are given to epithelial tumors, papillomata being discussed in the two initial chapters, following which is a short chapter on cutaneous horns, the illustrations being borrowed mostly from comparative pathology.

After a careful review of the subject of epithelioma, the author begins the study of adenoma and carcinoma, which he discusses together in the next six chapters. The author's peculiar views have already been alluded to; they are happily stated in the definition of the term neoplasms. "An adenoma may be defined as a tumor constructed upon the type of, and growing in connection with, a secreting gland, but differs from it in being impotent to produce the secretion peculiar to the gland it mimics." "Carcinomata are tumors that always grow from pre-existing gland tissue and mimic the parent gland, but they differ from adenomata in the fact that the structural mimicry is incomplete." We note, in passing, under the section on the treatment of cancer of the breast, a dogmatic statement with regard to opening the axilla which is decidedly at variance with the views of modern surgeons, viz.: "Of all the circumstances that modify the mortality of operations for removal of the mammary gland, none influence it so much as opening the axilla (!)" Again: "The axilla should not be opened unless there is really good reason to believe that its lymph glands are infected." We have previously mentioned the criticism that Mr. Sutton is hardly entitled to speak as authoritatively on surgery as on pathology.

The study of dermoids, it is unnecessary to state, is a thorough and scholarly one. The subject has always been a favorite one with the author, and no one is better fitted to discuss it *ex cathedra*. He divides these curious growths into four genera, viz.: Sequestration and ovarian dermoids, tubulo-dermoids, and dermoid patches. Under the head of tubulo-dermoids (those developing from canals) there is an interesting

chapter on bronchial fistulæ and cysts, and another on cervical auricles containing many curious facts. The illustrations throughout this portion of the book (though this may be said of the majority) are refreshingly new and instructive.

We can find no *raison d'être* for the chapter on monstrosities, even the explanation that "certain species are so apt to be confounded with dermoids." It is clearly out of place in a monograph on tumors, and only serves to weaken the pleasing impression produced by the preceding chapters.

A review of the four divisions on cysts arouses the unpleasant impression that considerable unnecessary matter has been introduced. How, otherwise, will the reader explain the extended reference to such conditions as hydrometra, hydronephrosis, diverticula, etc.? Strictly speaking, these may be "tumors," but if so why not simple hypertrophy and inflammatory enlargements? It is somewhat unusual to find hydrocephalus and cephalhæmatoma described as "neural cysts," even though these conditions, as well as diverticula, are classed under "pseudo cysts." The description of cephalhæmatoma as the "swelling familiar to practitioners as the *caput succedaneum*, is clearly a slip.

Hydatids are thoroughly treated in Chapter II. The concluding chapter, on the cause of tumors, is somewhat disappointing because of its vague generalizations. Cohnheim's theory, the author believes, "cannot be regarded as in any sense applicable to sarcomata, epitheliomata, and cancers." Assuming that cancer is a malignant adenoma, he finds no difficulty in inferring that the ducts of glands which open on free surfaces are the channels by which presumably parasites are introduced, although all varieties of cancer cannot be thus explained. Assuming that all neoplasms, whether innocent or malignant, are originally local troubles, he summarizes their treatment in the final sentence of the book: *Thorough removal of the tumor, whenever this is possible, at the earliest possible moment.*

In reviewing so briefly a work which can only be properly appreciated after a careful perusal, we have perhaps laid too much stress upon its minor defects. The candid reader will make due allowance for certain peculiarities of the author, such as faulty arrangement, a somewhat rambling style, the introduction of minute details regarding subjects of little general interest, and a certain dogmatic tone which crops out here and there, and will recognize how minute and painstaking have been his special studies, and how admirably he goes to the root of knotty questions in pathology. The book represents a vast amount of personal experience and abounds in novel and suggestive ideas. From his excursions into less frequented by-paths, the author does not, after all, stray very far from the beaten track, and the practical bearing of pathology on surgery is kept constantly in mind. As before stated, the illustrations are new and excellent, and the foot-notes and references show evidence of wide research, though with a distinctly local bias. Although it will probably not be so popular in this country as his former monograph, we feel sure that it will be recognized as a distinct addition to the literature of tumors. H. C. C.

THE THROAT AND NOSE, AND THEIR DISEASES. By LENNOX BROWNE, F.R.C.S.E., etc. Fourth edition. 8vo., pp. xviii., 734. London and Philadelphia: Lea Brothers & Co., 1893.

THIS fourth edition has been demanded so shortly after the issue of the third, that the author has had time to do little more than have the stereotyped plates of the last edition altered here and there to suppress some argumentative points and interpolate the results of some additional observations. The extensions are mainly in rhinological subjects—acute rhinitis, diseases of the cavities or sinuses accessory to the nose, etc.; while croupous rhinitis, dislocation of the columnar cartilage of the nasal septum, and perhaps some other conditions, appear as new subjects.

We note that the author returns to the treatment of chronic hypertrophic rhinitis with chromic acid, which he had long given up or disapproved of; and he even depicts his own applicator and describes his own method of using the caustic, which, however, varies slightly from that of other practitioners. He places rather more reliance, too, on the observations of Woakes than he formerly did, and while stating his reasons for the change in opinion, contends that the term necrosing ethmoiditis is misleading, as necrosis is not at all distinctive nor characteristic of ethmoiditis.

This fourth edition is better than the third, as the third was better than its predecessor. We continue to commend it to our readers, especially upon those subjects which present the positive evidence of the author's own experience. J. S. C.

DER MORBUS GRAVESII (SOGENNANTEN MORBUS BASEDOWII.) Von DR. P. MANNHEIM, Arzt in Berlin. Gekroente Preisschrift. Mit 2 Tafeln.
MORBUS GRAVESII (SO-CALLED MORBUS BASEDOWII.) By DR. P. MANNHEIM, Berlin. Prize Thesis. With two plates.

THIS work is a distinctly valuable contribution to the study of that peculiar affection, Graves' disease. We are glad to see that the author, although a German, breaks away from the common German custom of calling it Basedow's disease, and gives the credit of the earliest clear description where it is due.

The study is based upon forty-one cases observed by himself and upon a review of the older and latest literature of the subject. The first section of the book is an elaborate and interesting history of the disease. In this the author shows carefully in what way the work of Graves was overlooked by many, and proves that his earliest publications regarding it appeared in 1835, while Basedow did not write until 1840. Although cases were described before the writings of Graves were published, yet the writers failed to recognize the true nature of the disorder or the peculiar complexus of symptoms which constitute it. The further history of the malady and the principal contributions to the subject up to the year 1860 are extensively referred to.

In the second division of the thesis the author analyzes the newer

investigations upon the subject, studying the disease under the headings of eyes; circulation; struma; skin; organs of respiration, digestion, and generation; fever and general condition; nervous symptoms; complications; diagnosis, etiology, prognosis, and course; and then takes up briefly the pathological anatomy. This chapter is intended as a supplement to the work of Moebius in that it considers chiefly publications which have appeared since his critical review of the subject issued a few years ago. Besides this it contains an analysis of the author's own forty-one cases. The chapter is a very interesting one. Of course it is not complete, discussing as it does only the results of the latest investigations. To have included all of Moebius' work would have made the volume too large; still, it would have rendered it unnecessary for readers to have possessed both books, and would in so far have been an advantage. In the short review of the pathological anatomy of the later cases the author lays particular stress upon the lesions which have been described as occurring in the medulla, and illustrates them by a plate taken from a case of Mendel's.

The third chapter is an exhaustive "Critic of the Theories." Among the theories of the disease which have been advanced the author reviews those of disturbed circulation, of disturbed action of the heart, of disturbance of the sympathetic nerve, and finally that which attributes the symptoms to a central disorder. After reviewing the various symptoms in their bearing upon the truth of the central theory he adopts this, viz., that the disease is due to a paralysis of the central portion of the cardiac vagus and of the medullary vasomotor apparatus. Proceeding further in his analysis he rejects the view that the central paralysis is of the nature of a neurosis, and accepts that which claims the necessity of anatomical lesions for its production. He reviews, too, and rejects the theory of Moebius, which considers Graves' disease as an affection of the thyroid, an opinion which was based upon the resemblance of the disease to myxœdema. Without any expression as to the correctness of Mannheim's position regarding the etiological relation of anatomical lesions, it yet seems to us that he too readily rejects the idea of the neurotic nature of the affection, and bases his claim upon too few discoveries upon the side of pathological anatomy.

In the last chapter are considered the writings of different authors upon the therapeutics of Graves' disease. As a result of his analysis Mannheim concludes that the treatment by drugs is almost never of direct value, except in so far as it relieves certain symptoms. He appears to think not much better of electrical treatment. He favors climatic influences and hydrotherapy simply for their effect upon the general health. Surgical treatment he opposes altogether.

Following this chapter are the clinical histories of his patients in detail, and finally a list of 285 authors to whom reference is made in the text.

The book is an excellent monograph on the disorder; or rather a critical digest of the work done on the subject. It will be of great value to those wishing to add to their knowledge of the disease the best and newest information regarding it. It is not intended for those desiring to read a systematic treatise upon Graves' disease, since it presupposes a considerable knowledge of it. J. P. C. G.

PROGRESS

OF

MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

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Rational Therapeutics.

Dr. P. H. Pye-Smith concludes a very readable paper with the statement that the list of specific remedies, mercury, quinine, ipecacuanha, iron, arsenic, and salicyl-compounds, is not a large one. He would urge the importance of (1) first giving fair play to direct and simple remedies. (2) Testing the efficiency of physiological remedies; to make sure that potassium acetate, or broom or resin of copaiba, does increase the amount of urine passed, and not give them with the vague notion that they do good in dropsy. (3) Using our true specifics, which are well tried and certain, thoroughly with confidence and perseverance, pushing the doses until we get some evidence of their physiological action. (4) Mixing our purgative, diuretic, and other physiological drugs, but always giving our specifics each by itself. Lastly, he would urge the uselessness of many and much-advertised new drugs, for which are claimed wonderful specific or physiological powers on the slightest possible grounds. It takes a lifetime to know how best to use opium, digitalis, and other trustworthy drugs.—*The Practitioner*, 1894, No. 310, p. 241.

A New Agent in the Treatment of Epilepsy.

Dr. Paul Gibier continues his report, made one year ago, of his use of hypodermatic injections of the cerebrum of the sheep. He reports the use of this agent in nine cases. In four cases, notwithstanding the persistence of the patients, the treatment did not effect any appreciable improvement, and the injections did not appear to be superior to the bromides. Of the two cases reported in the previous communication, in the first the improvement has persisted, and there are intervals of from two to two and one-half months without the seizures, which are milder. The attacks reappear

when the injections are discontinued. The attacks of *grand mal* have diminished to one-tenth of their former severity, while the *petit mal* has disappeared entirely. In the second case the improvement has continued, the progress being marked in the intelligence of the patient, who remains sometimes several weeks without any epileptic manifestations.—*New York Therapeutic Review*, 1894, No. 1, p. 1.

The Treatment of Chorea.

Dr. Dujardin-Beaumetz believes that the chorea of Sydenham can be divided (1) as to its rheumatic origin, and (2) that connected with hysteria. For the rheumatic chorea, sodium salicylate frequently leads to unexpected disappointments, and antipyrine seems to be the more active remedy; fifteen grains at each meal, in "sirop de punch," cure resulting in from two to three weeks. In the chorea of hysterical origin, antipyrine is inferior to potassium bromide. Exalgine has not given the good results recorded by several writers, although it has not been given in the large doses recommended. In severe cases, when antipyrine does not suffice, sleep can be obtained with chloral, which is well borne by children, even in large doses, forty-five to even seventy-five [!] grains in the twenty-four hours. If there are cardiac complications it is necessary to use great care in using cold douches, or, indeed, the ether spray, along the spinal cord. Gymnastics are inapplicable in the paralytic form, and impossible in those who cannot make the gymnastic movements; and in severe cases, instead of regulating they exaggerate the incoördination. In the period of decline they may be useful. For the hysterical form, potassium bromide in large doses, and hydrotherapy, give the best results. For the anæmic individuals it may be necessary to add tonics, or to administer arsenic at the same time with the bromides. Arsenic given alone is not believed to be a curative agent, but associated with the bromides it manifests its tonic properties, and as well prevents the bromide-acne. Massage, in the later stages, is indicated, and as well gymnastics, with the reservations above noted. In the paralytic forms the bromide is contra-indicated, and wrapping in the wet sheet is recommended. Subcutaneous injections of hyoscine hydrochlorate, $\frac{1}{6\,0}$ to $\frac{1}{3\,0}$ gr., may be used in severe cases. Above all, it is important to feed the patients, and to use metal cups instead of glass, thus avoiding accident.—*Bulletin général de Thérapeutique*, 1894, 10e liv., p. 193.

Sleep, Sleeplessness, and Hypnotics.

Dr. S. V. Clevenger believes that it is doubtful if the bromides become substitution compounds in any of the animal tissues, further than to pervade the secretions and lessen activity by taking the place of nutrient materials. If bromide salt ingestion passes a certain point, distressing insomnia may result, probably from the anæmia exceeding what ordinarily occurs in sleep. Chloral in large doses may fail to do anything but cause distressing wakefulness and gastric irritability, especially in senile debility associated with heart disease; waste is but increased by chloral. Ergot has an indirect hypnotic effect, through its contraction of the bloodvessels, upon the muscles of which it acts directly. Phenacetine and phenocoll are, in effects, sedatives. Sulphonal has the advantage, that it can be given in hot tea or coffee without the

patient's knowledge. Trional and tetronal possess few if any advantages of the original drug (sulphonal), while it is claimed that the latter sometimes caused vomiting. Chloralamid requires slightly larger doses than chloral, but it produces a sleep more closely resembling the physiological than the latter, and it possesses the additional advantage that it does not irritate any mucous membrane. Apparently it is not contra-indicated by a weak heart or respiration. Of course, as to the time of its action, personal idiosyncrasy determines differences, but to no greater degree than with chloral, the average limit being from one-half to three hours intervening between the dose and its effect, the duration of sleep varying from two to nine hours. Hypnotic action may be classified as (1) derivation, such as removing irritative, quantitative, or qualitative causes; (2) elimination of quantitative or qualitative causes, as of some toxic agent; (3) reconstruction, by resupplying parts in states of defective nutrition; (4) minimizing activity until rehabilitation can overtake waste with supply; (5) restoration of normal function, as with digitalis or alcoholics. The ideal sleep-procurer would be one which abstracted nothing from the nervous system which it contained normally, nor added thereto anything deleterious; and as sleep is a process of repair or feeding of the nerves and their ganglionic centres, still more effective would be whatever caused sleep by repair of such waste; and unless credible evidence to the contrary appears in the course of time, we are in the possession of such a hypnotic in chloralamid.—*Journal of the American Medical Association*, 1894, vol. xxii., p. 325.

The Treatment of Common Forms of Dyspepsia in Women.

Dr. Robert Saundy believes that the essential remedy is rest—rest in bed. The rule is to keep the patient in bed until she has eaten ordinary diet without any discomfort for at least three or four days. When the patient is first put to bed, only milk and bread should be allowed. If there is vomiting, only milk, once every hour. When the food is tolerated, additions can be made to the diet, such as minced chicken, cold baked custard pudding, dry toast, and weak tea; afterward minced mutton and mashed potatoes, and finally ordinary diet. Should there be great loss of flesh, massage and faradism must be employed daily. If hysteria complicates the case, isolation is absolutely necessary, and to be effective it must separate the patient from all communication, direct or indirect, with her relatives or friends, excepting those who have to do with her medical treatment. When the patient is well enough to go about, it is desirable to complete the cure by change of air and scene. When gastritis is present the use of ordinary tea is to be avoided; but if it is made with boiling milk, instead of water, its irritating effects are so much diminished that it can be taken without harm. Coffee, unless taken after meals, is usually mixed with so much milk that the tannic acid is precipitated, and the resulting beverage is one of the best that man has devised. Cocoa, in spite of its popularity, is an uninteresting, harmless kind of drink. In gastralgia, without organic disease, patients should be encouraged to eat; positive harm is done by dieting them. If a little weak alcohol helps their appetite they should take it, but, on general principles, spirits should not be recommended. Light wine or light

beer, or even stout, may be really beneficial, the last especially, from the large amount of dextrins and sugar it contains. In atony and dilatation, when there is distinct motor defect, fats should be taken sparingly or not at all, and some care must be exercised to avoid the use of indigestible food. When the stomach is irritated or inflamed, we must carefully exclude all pungent and acrid substances, chemical and mechanical irritants, and fermentable substances. When exercise is productive of fatigue it must be discouraged; it should be taken early in the day, and may with advantage be avoided later. Electricity may be used in atony and dilatation, applied by means of a stomach electrode—a large, well-wetted, flat electrode being applied externally. The stomach tube is useful in the rare cases of necessary feeding by this method. It is useful to wash out the stomach in retention of its contents, and it is necessary in decided dilatation. The best antiseptic for washing out the stomach is a 1 per cent. solution of sodium salicylate. Of the drugs used on account of the prevalence of anæmia, iron, as Blaud's pill, ferric and magnesium sulphates, of the tincture of ferric chloride. Strychnine is useful either combined with the iron, or, if that is not indicated, with a mineral acid. Since constipation is the rule in these cases, aperients are indicated, and the salines are the best. There is but little choice between the magnesium and sodium sulphates, the former being more disagreeable. The various mineral waters are recommended to be taken really hot. Mercury is of value in all cases of subacute gastritis, either as calomel or preferably blue pill, two five-grain pills, one to be taken at bedtime in succession or alternate nights, according to the extent of its action. Whether it acts as an antiseptic, or by unloading the bloodvessels, or both, we are not sure, but its good effects are manifest. Whenever there is evidence of irritation, furred tongue, icterus, or mucous vomiting, bismuth is indicated, to be given with sodium bicarbonate, powdered rhubarb, or with irritable bowels the rhubarb should be omitted. If there is a deficiency in the hydrochloric acid of the gastric juice, fifteen drops in a wineglassful of water may be taken through a glass tube every hour for four hours after each meal. Pepsin is much more rarely absent, and, if necessary, it can be administered.—*British Medical Journal*, 1894, No. 1735, p. 673.

The Treatment of the Uric Acid Diathesis.

Dr. M. Mendelsohn observes that all remedies which are solvents of uric acid in test-tubes may not act as such in the body, and increase the amount of uric acid excretion in the urine. Lithium carbonate appears as the chloride in the urine, and piperazine, which in the test-tube dissolves seven times as much uric acid as does lithium, does not show any evidence of this property when taken into the body. Remedies which can be used for long periods of time without disturbance of nutrition of the gastric acid, are necessary. The use of mineral waters has limitations. During the past year investigations have been carried out concerning urecidin, a white, granular substance, which is remarkably soluble in water, and in aqueous solution, is of slightly acid reaction, so that if brought in contact with chlorides it forms only in part a combination, and therefore does not have an unfavorable influence upon gastric digestion. Although this remedy has no

direct action upon uric acid, yet after the internal use of this drug the urine acquires the property of dissolving the uric acid. Chemically, this remedy consists of a considerable proportion of sodium citrate, 67; beside sodium sulphate 27.5, and smaller quantities of sodium chloride, 1.6; and lithium citrate, 1.9. It is used in from fifteen to thirty grain daily doses, so that the urine is either faintly acid or at least neutral. With large dose, three to five drachms, slight diarrhœa may appear, but no other serious untoward symptoms.—*Verhandlungen des Zwölften Congress für innere Medicin*, 1894, S. 367.

The Action of Propeptone and Peptone upon the Circulation.

M. J. E. Abelous states that the following facts are commonly accepted: 1. Peptones retard the coagulation of the blood; 2, they determine a temporary arrest of urinary secretion; 3, after a more or less prolonged period of agitation they determine a particular narcosis—a peptonic narcosis; 4, they finally produce a notable lowering of blood-pressure and a dilatation of the abdominal vessels. A series of carefully-conducted experiments (curarized dogs, injections of propeptones; curarized frogs, injections of peptones; separated heart of tortoise, solution of propeptone and of peptone) show that both these substances have a sensibly analogous and manifest action upon the circulation. They determine a temporary, more or less long, more or less marked fall of arterial pressure, this fall being coincident with the dilatation of the abdominal vessels. This vaso-dilatation is in part reflex and in part due to the action of the ingested substances upon the nervous centres. It is often, but not always, observed after injection, a diminution of the frequence of the cardiac rhythm, and that in spite of a simultaneous lowering of blood-pressure. This change of rhythm then can be attributed to a double origin: 1. Excitation of the bulbar cardiac regulatory centre, or, 2, direct action of this substance upon the intra-cardiac slowing apparatus. It is this last action which has been sought to be demonstrated.—*Archives de Physiologie*, 1894, No. 1, p. 53.

Accidents from Salol.

M. Josias reports an instance where the administration of fifteen grains, followed by thirty grains on the next day, gave rise to a scarlatiniform erythema, with spots resembling measles, and red papules. The urine showed the presence of both phenic and salicylic acids. Dujardin-Beaumetz believed that one cause for these symptoms was to be found in the renal impermeability which is set up by the ingestion of aromatics, as phenol. Bardet has found that in febrile conditions the aromatics act as antithermics and chilling, cyanosis, and rashes are not uncommon; therefore, in these cases care should be exercised, while in non-febrile cases accidents do not occur, even if the doses are large. A proof of this is found in the administration of large doses in dyspepsia. Jasiewicz from his own experience could not admit the absorption of this drug when used as a topical application, even in large doses.—*Journal des Practiciens*, 1894, No. 23, p. 273.

MEDICINE.

UNDER THE CHARGE OF

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PULMONARY HYPERTROPHIC OSTEO-ARTHROPATHY.

DR. KERR (Bradford) records the following case (*Brit. Med. Journal*, No. 1728): A man, aged twenty-two years, previously healthy, had an attack of pleurisy in February, 1893, from which he made a slow recovery. In August following, aching pains and rapid enlargement of wrists and ankles took place in about three weeks, necessitating the use of larger gloves and boots ever since. There was free perspiration during illness, but appetite was not seriously affected. On examination he was well nourished, and with the exception of dulness and weak breathing over the right base, the chest was normal. There was slight morning cough, with expectoration free from tubercle bacilli. The thyroid gland was quite distinct, and the clavicles and bony thorax were unaffected.

"Both knee-joints were swollen, especially the right, the bones being enlarged, the joints distended but not tensely, and giving a fine crackling sensation on palpation. The enlargement about the joints was chiefly in the bones; the lower two-thirds of the radius and ulna were evenly and smoothly enlarged up to the ends; the wrist-joints seemed a little loose, but not distended; they gave the same fine crackling feeling; the carpal bones were not much thickened, the inter-phalangeal joints all enlarged from thickening about the bone ends. The soft parts were a little hypertrophied, the veins of the forearm not raised above the surface; the muscles were flabby in the arms and wasted in the hands. There was no œdema anywhere, but the hands looked puffy, the skin over the affected parts was thin, elastic, and smooth, with a pale rheumatic look, possibly from frequent perspiration; the fingers had the 'spindle-shaped appearance, like the legs of a stool,' the end phalanges being bulbous and over-extended. The nails were very large (*cf.* measurements), thin, much curved, and perfectly smooth, of a deep pink, almost livid, color. The lower extremities were affected, except that the nails were not so much enlarged as on fingers. The fists could not be quite clenched; the hypertrophied bones used to ache, now they were tender, so

that lifting a weight was painful from pressure. Height, 5 feet 4 inches; weight, 9 stone 7 pounds. Measurements: Figures in parentheses are mean of three individuals of same height and similar build. Circumference around right knee, 15¾ inches; around body of foot, 9¾ (9½); around malleoli, 10¼ (9); 2 inches above, 9 (7⅝); 6 inches above, 11½ (10⅜); 8 inches above, 13⅛ (12⅝). Length of great toe, 3½ (2½) inches. Circumference thickest part of right wrist, 7⅜ (6⅜); 2 inches above, 7 (6⅛). Length of hand, 8¼; middle finger, 4¾; nail of index finger, length 21 mm. (15); breadth, 23 mm., (14). Circumference of last phalanx of index finger, 2½ inches (1⅝). Displacement of hand immersed to 2 inches above wrist, 22½ ounces (16 ounces). The thick wrist, scarcely altered carpal region, long spindled fingers, and large curved nails show the diagnostic points differentiating from the short spade-like hand, with unaltered nails and sausage fingers, of acromegaly."

Syphilitic Tumors of Spinal Cord Simulating Syringomyelia.

Dr. Beevor (London) records the following case (*Lancet*, No. 3664): A gardener, aged fifty years, after two days' exposure to wet in July, 1892, began to drag the left leg. In a few hours he had weakness of the left arm and numbness of the right knee. "He noticed the weakness of the left limbs for a fortnight before admission, as well as wasting of the left arm; on the right side the numbness spread up to the groin, and during the last fortnight to the nipple. He had no pain till a week after the onset of the symptoms, when he began to have pain in the left shoulder, elbow, and wrist, and numbness in the left thumb and radial border of the forearm. There was no affection of the sphincters and no history of gonorrhœa or syphilis. On admission into the National Hospital for the Paralyzed and Epileptic in September, 1892, he had wasting of both the upper limbs, especially the left, with marked wasting and loss of power in the left serratus magnus, supinator longus, muscles of the forearm and intrinsic muscles of the left hand, as well as weakness of the left lower limb, so that he could only just raise the leg off the bed. Sensation was lost to pain, heat, and cold of the whole of the right leg and the right half of the trunk up to the fourth rib, while tactile perception was normal. The knee-jerk was excessive on the left side, and left ankle-clonus was present. Later, the loss of painful sensation spread up to the right arm (ulnar border) and left forearm, involving the radial border. There was loss of electrical reactions in the intrinsic muscles of the hand. Later he had paralysis of the sixth nerve of the right side, and he gradually became worse, and died on November 14th. On examination post-mortem two syphilitic tumors were found on either side of the brachial enlargement of the cord, the left one passing nearer the cord than the right, but the cord was too soft for accurate examination. Attention was drawn to the fact that loss of heat, cold, and painful sensations has lately been associated with syringomyelia when unattended by tactile anæsthesia; but in this case it seemed to have been caused by pressure of a growth from without." He had regarded the symptoms as pointing to disease of the gray matter, and he looked upon the case as one of syringomyelia, and had treated it accordingly. Iodide of potassium was given in small doses, but not pushed. The cord was so soft that proper sections could not be made, and the degenerating tracts were therefore not traced.

Basal Drainage in Chronic Hydrocephalus.

Mr. Parkin (Hull) records another successful case of this method of treatment (*Lancet*, No. 3664). The child first came under observation at the age of eleven months. In three months the circumference of the head had increased one inch to eighteen and a half inches, and its general condition was becoming less satisfactory. After admission to the hospital in April it rapidly became worse. It lay perfectly quiet in bed, never moving its limbs and not uttering the least cry, even when taken up roughly and shaken violently from side to side. The eyes were open and staring; the head was retracted. Food was taken badly, and it vomited twice or three times in the twenty-four hours. Pulse, 84. The anterior fontanelle was very hard, with no pulsation.

A little chloroform was given, and the under surface of the cerebellum was exposed about one inch below the superior curved line of the occiput and half an inch to the right of the middle line. The bone was easily gouged away, exposing the tense dura mater. After incision of the latter a few drops of fluid came away, but the passage of a probe into the subarachnoid space and gentle raising of the cerebellum allowed the exit of a quantity of clear cerebro-spinal fluid. A horsehair drain was inserted into the subarachnoid space and was brought out at the inner end of the wound, which was sewed up with a continuous suture. On the next day the condition of the child was most satisfactory. The eyes were opened intelligently, and no part of the sclerotics was visible above the pupils. The anterior fontanelle was soft and pulsated. The child smiled from time to time, moved its limbs about, and recognized its mother at once. Recovery was uninterrupted. The method of operating adopted by Parkin is described fully in the *Lancet*, July 1, 1893.

Lupus Treated by Thyroid Extract.

Byron Bramwell records two cases of lupus treated with good results by thyroid preparations. He was led to try this remedial agent in these cases partly in view of the favorable results obtained in other skin affections, notably psoriasis, and more especially owing to the liability of myxœdematous individuals to tuberculosis.

The first patient was a girl, aged sixteen and a half years, with extensive lupus of the face. It had commenced at the age of seven, and now involved the nose, left cheek, and upper lip, and a ring of scabs extended from each angle of the mouth down to the chin. An extensive cicatrix in which there were many ulcerated patches and lupus nodules covered the cheeks, and there were several outlying nodules in the surrounding healthy skin. The general health was good.

Thyroid treatment was commenced on February 15, 1893. On March 1st some crusts had fallen off and the face looked better. April 13th, feeling of heat and tightness of face gone, most of the crusts have fallen off and the outlying nodules are less distinct. When the thyroid extract was discontinued for a few days the face grew redder. At the end of May she had a severe attack of facial erysipelas. After this the amount of scabbing was less but there was distinctly more infection. The thyroid treatment was continued for eleven months, with scarcely any intermission. The author remarks:

"The disease is not yet cured, but it is very greatly improved. There is,

I think, reason to hope that further treatment will produce further improvement; but whether in the course of time a cure will result it is impossible to say. The patient and her friends state that the face has never been anything like so well as it is now since the disease became severe five years ago. But it is only right to state that the vascularity of the face varies considerably from time to time."

The second case is that of a girl, aged eighteen years, in whom the disease began at ten years of age. The disease involved the alæ nasi, lips, and right eyelids. Thyroid treatment was commenced on December 13, 1893. Between December 23d and January 9th a decided improvement took place and had been maintained up to the present time. In the same article the author speculates on the possible efficacy of thyroid preparations in internal tuberculosis, leprosy, and cancer.—*British Med. Journal*, No. 1737.

The Diagnosis of Calculous Atrophy of the Pancreas.

Lichtheim (*Berliner klinische Wochenschrift*, 1894, No. 8, p. 185) has reported the case of a man, thirty-six years old, who at the age of twenty-two was suddenly seized with a severe attack of abdominal colic, attended with vomiting of greenish mucous material. The bowels were costive and the stools were said to have been black. There was fever, with sweating, and the patient kept in bed for six weeks. In the years that followed the man had successive attacks of similar character, though not of the same intensity, with intervals of freedom of several weeks' duration. At the age of twenty-eight the man was again seized with a severe attack of colic, compelling him to remain in bed for eleven weeks. Thereafter he continued in fairly good health, although constipation persisted. For a year he had suffered with diarrhœa, which had set in suddenly and had resisted the usual therapeutic measures. The stools were at first yellow, but gradually lost color. There was neither fever nor pain. With the persistence of the diarrhœa the appetite and, particularly, the thirst increased, but the patient nevertheless wasted rapidly. The weakness was marked, especially in the lower extremities. At times cramps occurred in the calves of the legs, and there was a sense of formication in the toes. Examination disclosed slight impairment of the percussion-resonance at the apices of both lungs, with harsh expiration and râles. Tubercle bacilli were at first not found in the sputum, but later their presence was demonstrable. Some four pints of urine were passed in the twenty-four hours, with a specific gravity of 1043 and containing an abundance of sugar; there was, however, no reaction to ferric chloride and none to tests for acetone. The quantity of sugar diminished notably upon the institution of a meat-diet, and ultimately all had disappeared. The liver and spleen displayed no physical alteration, and at no time had there been icterus. There was no history of alcoholism or syphilis. It was believed that the attacks of pain were due to the passage of pancreatic calculi, the presence of which had led to atrophy of the pancreas, with the development of diabetes; the diarrhœa was associated with the pancreatic lesion. The stools contained fat crystals, but no free fat even after the administration of fat with the food; tubercle bacilli were looked for, but not found. There was also no delay in the response of the urine to tests for salicylic acid after

the administration of salol. There was little change in the excretion of nitrogen in the urine. Despite assiduous treatment the general condition grew progressively worse, and death ensued. Upon post-mortem examination both lungs were found invaded by tuberculosis, while the pancreas was cirrhotic and its duct occluded by calculi. Microscopic examination disclosed an incrustation of the smallest pancreatic radicals with calcium salts. In the midst of the sclerotic tissue of the pancreas small areas of glandular structure could be everywhere seen.

A Tumor of the Optic Thalamus.

Masing (*St. Petersburger medicin. Wochenschrift*, 1893, No. 42, p. 377) has reported the case of a boy, fifteen years old, in whom tremor appeared intermittingly in the extremities of the right side, followed in a little while by weakness. In the course of a month headache set in, with, from time to time, vomiting and disturbance of speech, and subsequently diplopia. At about this time the boy had a right-sided convulsive seizure, with loss of consciousness, and it was on account of this that he presented himself. The entire right side of the body, including the face and the tongue, was paretic. There was no ataxia, and the muscle-sense was preserved. Sensibility was impaired upon the entire right side. The functions of bladder and rectum were preserved. The eyes were in a position of slight divergence. The diplopia involved the whole visual field. There was slight drooping of the left upper lid. The external ocular muscles supplied by the third nerve on either side were all paretic. The pupils were equal, of moderate size, but failed to react to light, although they contracted in convergence; the influence of accommodation could not be studied. There was no hemianopsia. In the absence of a cardiac lesion, and in view of the gradual development of the symptoms, a diagnosis of cerebral tumor was made; and on account of the age of the patient its nature was thought to be tuberculous, although the lungs presented no evidence of disease. Against the localization of the growth in the cortex or at the base was the wide distribution of the symptoms. Disease of the posterior portion of the left internal capsule would explain the hemidysæsthesia, the hemiparesis, and the paresis of the right side of the tongue, but not the unequal oculo-motor paresis; so that the left cerebral peduncle was concluded to be the seat of the neoplasm. In the course of a week some improvement took place. At the end of this time however, headache set in without obvious cause, and was followed by convulsions and coma, from which the patient did not emerge, death taking place a day later. Upon post-mortem examination the left optic thalamus appeared to be twice the size of the right, but it was found to be replaced by an ovoid tumor, about the size of a small apple, having a long diameter of 4 cm. and vertical and transverse diameters of 3 cm. each. The growth was surrounded by a delicate membranous capsule; it was bounded above and externally by the corpus striatum, posteriorly by the corpora quadrigemina, inferiorly by the left cerebral peduncle, and internally by the third ventricle. Its upper surface was irregularly nodular. On section it presented a grayish-brown color and a medullary consistence, and was traversed by numerous vessels and was the seat of several hemorrhages. Upon microscopic examination the tumor proved to be a sarcoma. Upon the floor of the aqueduct

of Sylvius, close to the line of division between the third and fourth ventricles, were also two small extravasations of blood about as large as pinheads. The dura was tense, the longitudinal sinus empty, and the gyri flattened. All of the ventricles were distended with fluid. The boundary between the left optic thalamus and the striate body was displaced outward, upward, and forward. The right cerebral peduncle appeared to be normal; the left was flattened. The left corpora quadrigemina were displaced backward. The immediate cause of death seems to have been the condition of hydrocephalus. The oculo-motor palsy is to be ascribed to the hemorrhages on the floor of the aqueduct of Sylvius. The derangement of sensibility and motility upon the right side of the body are believed to be due to transmitted pressure upon the left internal capsule and cerebral peduncle. Though the pulvinar was profoundly involved, there was no hemianopsia.

SURGERY.

UNDER THE CHARGE OF

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OBSTRUCTION OF THE INTESTINE FROM GALL-STONES; OPERATION; CURE.

KÖRTE describes (*Deutsche medicinische Wochenschrift*, 1894, No. 8) the following case: Man, aged fifty-two years, had suffered from frequent attacks of biliary colic, at which times a large number of stones passed. He became suddenly sick with severe pain in the lower left part of the abdomen, the bowels were obstructed, and vomiting and singultus supervened. On the fifth and sixth days of the illness the vomiting was fecal. On admission to the hospital the patient was somewhat collapsed, the abdomen tympanitic and tender to pressure. On the left side tense intestinal loops could be felt. The patient had received, first purgatives, then opium, pills of ice, and high rectal enemata, without influencing the condition.

Cœliotomy was performed. The small intestine was found distended with gas and water, the peritoneum somewhat reddened and the glazing lost, and a few tablespoonfuls of bloody fluid in the pelvis. Upon examining the intestine a hard body was found twenty or thirty centimetres from the valve of Bauhin. As this could not be moved by pressure, the bowel was incised over the mass. The bowel was under great tension. The obstruction was found to be due to a soft, laminated stone as large as a medium-sized egg. The author thinks it had been free in the intestine for some time, and in

passing along was finally arrested by colic, when the symptoms of obstruction developed. The theory advanced by König, that small concretions might cause obstruction by invagination of the mucous membrane, and this being pushed forward by the stone, was not borne out by this case.

The diagnosis in these cases will always be obscure. It is rarely certain what the cause of the obstruction really is. Failure of expectant treatment, however, indicates operation. Of four cases of this kind operated upon by Körte, three have recovered.

Sweating Feet and Flat Feet.

v. Lesser claims (*Deutsche med. Wochenschrift*, 1893, No. 44, p. 1070) that the condition of flat-foot depends upon the previous existence of the so-called sweating feet. In the spontaneous variety of the latter, beginning varicose changes of the cutaneous veins are always visible, although in many cases insignificant. This condition is most frequently observed at the age of puberty, but may also occur in childhood; it is sometimes inherited. On this condition depends the occurrence of flat-foot. It is most frequently seen in males, and when occurring in females usually develops at an earlier period. The nature of the occupation, as, for example, long-continued standing and the carrying of heavy loads, helps to develop this condition. Males tend to resist longer these influences than do females. In the so-called spontaneous flat-floot there is atrophy of the muscles of the leg and sole of the foot, and at the same time varicose changes in the muscle veins in greater or less degree. In the female sex the abnormal sweat-production usually ceases earlier than in the male, because in the former the development of varices under the influence of pregnancy is much more rapid, and brings about at an earlier period atrophic conditions of the skin. According to age, sex, and occupation, therefore, sweating feet or flat-feet occur either separately or together, the former being the earlier complaint of the two. The more marked development of the varices, besides the atrophy of the skin and the resulting consequences, as a solution of the epithelium and the formation of ulcers, belongs to later years.

The Use of Ichthyol Suppositories in the Treatment of Prostatitis.

Freudenberg reports (*Centralblatt für klinische Medicin*, 1893, No. 26) his experience with the use of ichthyol in from thirty to forty cases of prostatitis. The cases were almost exclusively of the chronic variety or in the late stage of the acute form. The preparation used was the sulphate of ammonium ichthyöl, made into suppositories with cacao-butter. Some of the cases were gonorrhœal or post-gonorrhœal, and others were non-gonorrhœal.

In the acute stage, especially in gonorrhœal prostatitis, the author had no occasion to use ichthyol, inasmuch as he was quite satisfied with the result of the usual treatment for these cases.

Marked improvement was observed in the cases in a remarkably short time, and in nearly all cases complete cure of the existing symptoms followed. He uses the following formula: ℞. Ammon. sulpho-ichthyol., 0.3–0.6–0.75 grammes (5–10–12 grains); ol. theobrom., 2–2.5 grammes (30–45 grains). One

of these to be used in the morning after evacuation of the bowel and another in the evening, at bedtime, and a third only if there has been an evacuation during the day. In some cases he combined iodoform with the ichthyol and cacao-butter. The author concludes by the statement that in the treatment of prostatitis, at least in its chronic form, ichthyol is a valuable acquisition to the therapy of this disease.

The experiences of Scharff, Ehrmann, and Ullmann in the acute and gonorrhœal forms of prostatitis are quoted. These observers all report very satisfactory results.

Freudenberg advises against the employment of ichthyol in hollow suppositories, as when the former comes in contact with the rectal mucous membrane it might give rise to irritation.

Functional Trouble following Old Fractures of the Patella.

After a careful study of this subject, Choux (*Rev. de Chir.*, March 10, 1894) comes to the following conclusions:

I. The functional troubles consequent upon old fractures of the patella are either insufficient extension or flexion.

II. The difficulty in extension is due less to the atrophy of the triceps muscle than it is to the momentary physiological inability of the muscle to act efficiently upon the lower fragment of the patella.

III. The difficulty in flexion is dependent on the fibro-articular thickenings, which are themselves due to the retraction of the patella tendon and to the method of union between the fragments.

IV. Of the five modes of union, as generally divided, two types alone are capable of interfering with flexion; they are the short, but stiff, osseous or fibrous union and the fibrous union with two to five centimetres' separation of the fragments.

V. The prognosis in incomplete extension may be doubtful for several years, but restoration of function is generally the rule. Intra-osseous suture of the fragments is indicated in cases where the spontaneous re-establishment of function is not realized after a reasonable length of time.

VI. In regard to partial ankylosis resulting almost always from short, rigid union between the fragments, either osseous or fibrous, but increasing the length of the patella two or three centimetres. He considers the removal of one of the two fragments the only possible means of overcoming the functional difficulty, unless these types are transformed, as often happens, into types more favorable to flexion.

VII. The articular inflammatory thickenings, which often disappear, should be held under observation for from twelve to fourteen months, and are eminently fitted for the hydro-thermal treatment as used in the hospital of Bourbonne.

The Relation of Behring's Therapeutic Serum to Immunization from Poison.

Buchner (*Berl. klin. Wochenschr.*, 1894, No. 4) claims that his experiments enable him to deny the theories of Behring and to confute them experimentally. He objects to the method of their experimentation, and says that it

only shows that the animal was immune. His experiments showed that the poison (tetanus) and the antitoxin did not actually act on each other, but that they act separately upon the organism. The antagonism exists only in so far that the antitoxin makes the organism, the cells, and tissues able to resist the toxins—a true immunity. He finds substantiation for his results in the work of Centanni, Tizzoni, and Cantani.

The antitoxic serum must be of great power, according to Behring, to destroy the working of a small dose of specific poison.

Behring's explanation of the nature of the antitoxin as a product of reaction in the animal body is contradicted by Buchner, he believing that the antitoxin is a bacterial product—a changed toxalbumin.

Case of Tumor of the Spinal Dura Mater.

Ransom and Thompson (*Brit. Med. Journ.*, February 24, 1894) report a case in which an extra-dural tumor was located in the region of the fifth dorsal vertebra. There was moderate, dull, aching, inconstant pain and was distinctly separated from the area of complete anæsthesia. There was complete paralysis preceded by a spastic condition. There was localized complete sensory loss and only slight and transient hyperæsthesia. The operation disclosed a tumor, bluish and lobulated, in the position of the extra-dural fat. It was readily separable from the dura and bones. The dura beneath it was markedly depressed. It measured about one and a half inches in length and *in situ* three-fourths inch broad.

Four vertebral laminæ were removed to expose the tumor, the canal being opened too low down at first. The wound was frequently irrigated with a 1 : 2000 perchloride of mercury solution and, just before closing, with iodized water. The growth was found to be a round-celled sarcoma. The patient's condition after the operation was not very good, and he died the third day after operation. The post-mortem showed that there had been no attempt at healing and the wound was in an unhealthy, septic condition. There was no involvement of the cord, though there were some slight signs of disorganization.

Suprapubic Cystotomy.

Southam (*Brit. Med. Journ.*, January 13, 1894), in a clinical lecture, relates six cases of suprapubic cystotomy, of which four were performed for calculi, one for tumor of the bladder, and one for chronic cystitis accompanied by hæmaturia. Three of the stone operations were performed for hard stones in aged patients with greatly enlarged intra-vesical prostates. The author's reasons for preferring this method in these cases are: The difficulty of crushing and evacuating calculi from the pouch behind an enlarged prostate; the irritation and injury consequent upon the introduction and manipulation of the instruments; the hardness of the stones would necessitate a prolonged operation and be followed by shock, which was to be avoided in aged patients. Lateral lithotomy was precluded by the size and vascularity of the prostate. The fourth case, a boy, aged eleven, had a calculus one and one-fourth by seven-eighths inches. The suprapubic operation was used on account of the irritability of the urethra. The fifth case, a papilloma of the

bladder, was too large to remove *per urethram* in the female patient in whom it occurred. In the sixth, a chronic hemorrhagic cystitis, the suprapubic operation gave a chance to inspect the bladder, and a diverticulum that could not be felt was seen, ulcers touched with caustic, the bladder drained, and the patient made a good recovery.

Entero-vesical Fistula Treated by Laparo-enterectomy.

An interesting and rare case of entero-vesical fistula is reported by Heuston (*Brit. Med. Journ.*, February 24, 1894). The patient, a stout, full-blooded man of thirty-six, had two attacks of influenza, and apparently never fully recovered his strength. A year afterward he noticed that portions of feces and gas were passed *per urethram*. Examination with a sound disclosed nothing; milk injections into the bladder did not show in the stools, but an injection *per rectum* of sodium salicylate, and the urine tested a few minutes later by perchloride of iron, showed a relatively large quantity of sodium salicylate in the urine.

A laparotomy was performed; a fistula the size of a pea found; the bladder wound closed; and the intestine, which contained a cylindrical neoplasm, resected. This growth proved to be, under the microscope, a columnar epithelioma. The patient rallied well, but died with all the symptoms of collapse on the fourth day. The autopsy showed peritonitis to be absent and that the operation had been successful.

A Case of Pseudarthrosis of the Upper Arm.

In speaking of the methods of treatment in such cases, v. Eiselberg calls special attention to the Gussenbauer clamp, which he considers a simple and efficient method of holding the bones firmly in position. Many complicated methods have been recommended, and in late years methods by Bircher, Wille, Dollinger, Senn, and Cholot. The author considers this method superior to all the others on account of its simplicity and ease of application. The clamp consists of a bar having two prongs perpendicular to it at either end; they are sharp and three-sided.

Two small incisions are made down to the bone, one above and the other below the seat of fracture, and the clamp is driven into place while the ends of the bone are held closely in contact. Five or six sizes should be kept on hand. They have been used with great satisfaction for years in Billroth's clinic. The absolute fixation that is given by the use of this clamp insures a sufficient blood-supply to the lower fragment by giving absolute rest, and the lesser interference of the small points of the clamp than is found in the use of an ivory pin.

A Large Cerebral Tumor without Headache and with Normal Eye-ground.

Pel (*Berlin. klin. Wochenschrift*, 1894, No. 5) reports an interesting case of a cerebral tumor. The primary symptoms of paræsthesia of the fingers in the right hand were followed by paralysis, which extended over the hand and forearm. Not until a year later did paralysis of the right leg follow,

accompanied by enfeebled intelligence and memory, with difficulty in thinking and perverted disposition. A month later there were epileptiform seizures, with a disturbance of speech that followed and remained. There was, however, no headache, abnormal condition of the eye-grounds, dizziness, nausea, or vomiting. Only in the last few days did the patient complain of headache when questioned.

Thus there were absent symptoms that have been insisted upon by all authors as pathognomonic of brain tumors. The slow development of the symptoms and the spread of the paralysis, and the involvement of the so-called psycho-motor centres, showed the location of the tumor, and as internal medication was of no avail, operation was decided upon. The operation disclosed a large chestnut-shaped tumor in the motor area, which involved the pia mater only in one point. The tumor was easily removed, as it was encapsulated and did not involve the brain cortex. The tumor was soft and pressed into the brain substance. It was about two and one-eighth inches long, one and three-quarter inches wide, and one inch thick. It was a cystic fibroma. The patient died shortly after the operation, of heart failure. The case illustrates the possibility of the presence of a cerebral tumor in cases where some of the symptoms that are considered characteristic are absent.

OTOLOGY.

UNDER THE CHARGE OF

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Trans-illumination of the Mastoid Cells.

Dr. George W. Caldwell, in the *New York Medical Journal*, vol. lviii., No. 3, considers the subject of the trans-illumination of the mastoid cells as a means of diagnosis of mastoiditis interna suppurativa. In view of the importance of determining, before any operation is performed upon the mastoid, whether or not there is any pus within this cavity, he suggests that a method of trans-illumination of these cells by means of a miniature electric lamp, and the conclusions to be deduced therefrom based upon the fact of the diaphanous nature of healthy mastoid cells and the opacity of the pus, will greatly aid the surgeon. He then describes an apparatus devised for this purpose. The apparatus required is a battery which will develop about ten volts, regulated to light well, but not to burn out a two- or three-candle power electric lamp of very small calibre. This is protected by a thin rubber tubing, fenestrated at one end, and made to fit snugly at the meatus by a washer of larger tubing. In a perfectly dark room the small electric lamp is inserted well into the external auditory meatus. He says: "Instantly the healthy mastoid is illuminated with a ruddy glow, extending from the apex to the lateral sinus and to the limits of the cells above. The reverse manner may

be more satisfactory in a given case, as when the canal is more obstructed and painful, and a larger lamp may be used. A speculum of large size being placed as for examination of the membrana tympani, the electric lamp encased in a rubber tubing projecting slightly beyond the limit is pressed against the mastoid and a current made, when the external auditory canal and middle ear will be filled with rosy light from the posterior wall. By placing the lamp on different portions of the mastoid the limitations of the cells and the position of the lateral (?) sinus may be accurately mapped out and the particular region in which a pathological process exists demonstrated. If the cells are occupied by a purulent collection the glow will be absent and the cells will be dark. Comparison with the opposite healthy side renders the diagnosis of pus in the mastoid cell complete, whether or not the usual symptoms are present, for suppurative mastoiditis may exist without external indications, which, indeed, is the most dangerous form, as the process tends to extend inward, not outward."

The writer claims that the method which he thus submits is scientifically accurate, easy of application, painless, strikingly pictorial, instantly decisive, and demonstrative to the patient's friends.

The Surgical Pathology of the Mastoid Process.

Dr. J. E. Sheppard, of Brooklyn, in the *Brooklyn Medical Journal*, vol. vi., Nos. 4 and 5, contributes a carefully written article on this important subject. The anatomy, primary mastoid periostitis, secondary mastoid periostitis, inflammation of the mastoid cells, sclerosis, condensing ostitis, with symptoms and diagnosis of acute inflammation of the mastoid cells, and the prognosis are given with great completeness. Cerebral complications, such as meningitis, brain abscess, extra-dural abscess, diseases of the sinuses with phlebitis, thrombosis, and pyæmia, are also duly considered. Cholesteatoma, too, one of the most interesting conditions found in the ear, is considered. New growths in the lymphatic glands over the mastoid, fibrous polypi, and simple polypoid granulations, which may arise in the mastoid process and project through carious defects into the mastoid cortex behind the auricle, are also alluded to. Epithelioma and sarcoma are also mentioned. The indications for the operation are those so well known as not to demand a lengthy mention in this review.

The operation upon the mastoid is carried out with well-known antiseptic precautions. The article concludes with a consideration of Stacke's and Schwartze's operation on the mastoid for a maintenance of a communication between the antrum and the outer ear.

Cholesteatoma of the Ear.

Dr. Harry Friedenwald, of Baltimore, Md., under the above title gives a very interesting account of several cases of this disease. With quite a long consideration of the subject, it says that it is important to remember that there is a tendency for cholesteatoma or cholesteatomatous masses to recur. Patients are therefore to be examined at intervals of a few months for a long time after their apparent cure.

The treatment consists chiefly in the thorough removal of the cholestea-

tomatous masses, and complete antiseptic cleansing of the drum-cavity by the ordinary well-known means.—*Medical News*, vol. lxii., No. 10.

Counter-irritant Effects of the Usual Mastoid Operation.

Dr. Albert H. Buck, of New York, maintains that in certain cases the good effects of the operation on the mastoid are not confined to the benefits directly attributable to good drainage and thorough cleansing of the parts, but that the derivative or counter-irritant influence of the operation plays a very important part in effecting a cure in these cases. As setons and issues were once looked upon as valuable therapeutic agents, so an operation upon the mastoid process may be regarded as "an issue on a comparatively large scale."—*Medical Record*, New York, vol. xliv., No. 5.

[This undoubtedly is true, but it is difficult to understand how such irritation can have any beneficial influence over those cases of more or less active intra-cranial inflammation set up by a disease of the ear, or that they could have sufficient counter-irritant power to turn the scale from a fatal to a favorable issue, as the author believes to have been the result, as shown in the histories of three cases which he gives. Intra-cranial irritation might be thus relieved, but intra-cranial inflammation is not likely to show itself amenable to this form of treatment. Judging from the notes of the cases, they may be regarded as simple cases of general systemic and cerebral irritation and not intra-cranial inflammation.—Rev.]

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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Blinding by Direct Sunlight.

George Mackay (*Ophthalmic Review*, vol. xiii., Nos. 147–149) publishes a very complete study of this subject, made with special reference to prognosis, reporting seven cases of his own and quoting previously reported cases. The affection follows too prolonged looking at the sun, and cases are apt to appear shortly after the occurrence of an eclipse.

There is no record of any microscopic study of the lesions in man. But experimentally produced on the eyes of the lower animals, they include an extension of the pigment-laden processes of the hexagonal epithelial cells between the rods and cones, with alterations of these latter structures. Later

there is exudation into the affected tissue, and finally a cicatricial formation of pigmentary connective tissue in the outer part of the retina, with atrophic changes in the neighboring choroid. Shutting off the invisible heat-rays does not prevent the injury.

The normal after-image succeeding a brief glance at the sun undergoes changes of color lasting for a few seconds, or at most a few minutes, and is followed by prompt recovery. The persistence and reappearance on closing of the eye of an after-image, which does not rapidly undergo alteration in color, may be taken as evidence that the retinal stimulation has passed the physiological limit. Later, often after some hours, it is noticed that there is a positive central scotoma in the field of the injured eye. An unfortunate characteristic of the affection is that this is apt to be the eye which has been previously the better.

The scotoma is usually quite small, occupying less than an area twenty millimetres in diameter of the field measured at a distance of one metre. The ophthalmoscopic changes are very slight and scarcely characteristic, the region affected being usually included within the fovea. During the first week there may be slight loss of light reflex at the fovea. During the second week a tendency toward increasing pigmentatien or obscure signs of exudation may be noticed. Later the fundus may appear quite normal. Sometimes reddening of the optic disk and dilatation of the retinal vessels have been noted. The sensations noticed by the patient in addition to the scotoma, include a "revolving movement" or "oscillation," giving a tremulousness to the object looked at, which may be an early and very persistent symptom; and metamorphopsia from displacement of the retinal elements, which may be permanent. It is possible to have full or nearly full acuteness of vision retained, although permanent damage has occurred, because the affected area is so small as to allow good, apparently central vision alongside of it.

The prognosis must depend on the time which has elapsed since the accident; the degree of impairment of visual acuteness for test-type and for colors; the extent of the scotoma, and especially of the absolute area contained within it; the gravity of the ophthalmoscopic changes; the presence or absence of oscillating movement, or metamorphopsia; and the local and general healthiness of the subject. Taking this into account, and supposing the eye to have possessed normal vision, Mackay roughly divides the cases into four classes: 1. A patient with vision = 1/3 or better in the first week (and the earlier the better), has a good chance of practical recovery in one month. 2. A patient with V. = 1/3 in the second week, has a fair chance of practical recovery in three or four months. 3. A patient with V. = 1/3 in the third week, will probably recover slowly in five or six months, but the chances are rather against his complete restoration. 4. A patient with vision which is poorer than 1/3 at any time, though he may make rapid progress in the first month, seems to have a bad chance of recovering V. = 6/6. Hitherto no case with vision poorer than 1/3 has regained 6/6. By "practical recovery," is meant cessation of obtrusive defect.

The treatment should be preventive—the use of sufficiently dark glasses or other device to exclude the greater part of the light from the eye when the sun is to be directly observed. For this purpose the glass must be at least

so dark that no object illuminated by diffused daylight is visible through it. When the injury has occurred, protection of the eyes from great alterations of light, rest from eye-work during the first month, and attention to the general health are indicated. The use of strychnine hypodermatically or galvanism seems to have little support from theory or experience.

Tumors of the Optic Nerve.

Braunschweig (*Von Graefe's Archiv*, vol. xxxiv. 4) reports a series of four cases. The most characteristic symptoms are blindness and progressive exophthalmos. Ocular movements remain good; the ophthalmoscope shows neuritis or atrophy; pain and tenderness on pressure are usually absent. The tumors may sometimes be made out on palpation. The treatment is removal, the operation preferred being through the temple with an incision from the upper outer margin of the orbit to the zygoma down to the periosteum, which is raised, and the outer wall of the orbit removed. By this operation the nerve can be examined and removed as far back as the optic foramen, with the least possible danger to the eyeball and the tissues surrounding it. Recurrence of these tumors is infrequent. They are usually classed as myxosarcoma. Braunschweig's patients were otherwise healthy; three of them males and one female, aged from eighteen months to twenty-four years.

OBSTETRICS.

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The Danger of Intra-uterine Injections of Glycerin for the Production of Abortion.

Pfannenstiel in the *Centralblatt für Gynäkologie*, 1894, No. 4, relates his experiences with intra-uterine injections of glycerin for the production of premature labor. He states that when this procedure was first published he admired its boldness, and concluded that the dangers of it were but occasional. His later experience in two cases, the histories of which he gives, has led him to a change of opinion regarding the above method. In the first case, labor was induced on account of advanced albuminuria, after the usual therapeutic means had been tried. Following consultation with his colleague,

Wilke, the author, under all aseptic precautions, injected 100 cms. of chemically pure glycerin between the fœtal membranes and uterine wall. In a short time the patient showed symptoms of profound collapse, which, notwithstanding all means of restoration, ended fatally in a few hours, the patient dying undelivered. The autopsy showed death to have been due to nephritis.

In the second case, induction of labor had been attempted by bougies four weeks before term on account of rhachitic pelvis combined with stenosis of the os uteri and cervix. The bougies not having the desired result, after consultation 100 cms. of concentrated glycerin were injected. One hour afterward the patient suddenly became cyanotic, and the temperature, which had been 39°, fell to 37° C., rising again to normal.

The urine drawn off by catheter an hour after the injection showed blood, albumin, and casts, and spectroscopic examination demonstrated methæmoglobin with hæmoglobin. In twenty-four hours these abnormal constituents gradually disappeared. The glycerin failed to excite uterine contractions, but a small living child was delivered later by other means. The mother recovered.

The author believes the glycerin in the above cases caused decomposition of the blood, and he agrees with Afanassiew, who found that in dogs glycerin produced hæmoglobinuria, glomerulo-nephritis, and even interstitial nephritis, Although in the first case nephritis undoubtedly existed, it is his opinion that the glycerin injection hastened the fatal termination.

The Influence of Cornutin and Ergotin upon the Course of Labor.

Krohl (*Archiv für Gynäkologie*, Band xlv., Heft 1) discusses at length the effects of preparations of ergot upon the uterus during and after labor. He finds that the uterus is favorably influenced by both ergotin and cornutin, but particularly the latter; the diminution in the size of the uterus caused by these agents being most noticeable in the first three days of the puerperal period. In labors, when ergotin or cornutin have been employed, there is apt to occur an expulsion of clots of coagulated blood at an earlier period than when no medicament has been used; and it has also been found that the internal os uteri closes much sooner; this rapid closure being particularly noticeable after the exhibition of cornutin.

The lochia alba is found to appear sooner when cornutin is used than without this means. The pulse undergoes some slowing during the administration of ergotin and cornutin, but no temperature change was noticed, nor was the secretion of milk influenced in any way. These agents distinctly favor uterine involution and diminish considerably the congestion of that organ following labor; besides this, they prevent the collection of great masses of blood in the puerperal uterus, thus preventing decomposition.

As the whole inner surface of the uterus after birth presents a great irregular wound, these remedies by compression prevent the absorption of wound secretions through the lymph spaces. The author does not recommend the employment of ergot in substance, because of its uncertainty of action, but holds in high regard cornutin, or cornutin containing ergotin. Of these

preparations Bombel's ergotin is particularly to be commended, although he fears the very considerable cost will prevent the extensive use of this preparation.

In concluding his article, the author sums up the indications and contraindications for the use of ergotin, as follows:

It is indicated:

1. In all obstetric operations, and especially shortly before Cæsarean section.
2. In atony of the uterus.
3. After manual deliverance of the placenta, and after abortion and macerated fœtus.
4. In cases of twin labor, when atony of the uterus is threatened in consequence of the sudden evacuation of the overdistended uterus.
5. In the puerperal period, in subinvolution of the uterus and in recurring sanguineous lochia.
6. In puerperal endometritis combined with vaginal inflammation, and particularly after vaginal irrigation.

It is contraindicated in:

1. Hemorrhage during pregnancy.
2. In cases of weak pains in the period of dilatation and expulsion. It is particularly contraindicated in the latter when combined with contracted pelves. In cases of tumors filling the small pelves or the soft parts of the birth canal. In tetanus uteri and when stricture of the os uteri exists.

Tuberculosis and Uncontrollable Vomiting considered as Indications for Abortion.

Guensbourgue (*Archives de Tocologie et de Gynécologie*, March, 1894): A somewhat extensive research made by the author seems to disprove the oft-repeated assertion that pregnancy delays the progress of phthisis, and rather establishes the reverse. Lebert reports 7 cases in whom the malady had lasted from four to ten months; 2 succumbed ten to eleven days after accouchement; the 5th from five to ten weeks after labor. Of 25 cases of tubercle in pregnant women the malady terminated in death in 3, three months after accouchement; 5 cases six months after; 11 before the end of the first year, or 76 per cent. during the first year. In young girls cured of a tuberculous affection before their marriage, the children of their first pregnancies die soon after birth or are scrofulous or tuberculous. The same view is held by Müller, who adds that in tuberculous women the accouchement is complicated by uterine feebleness and hemorrhage. Lactation seems even more injurious than pregnancy to the tubercular. The author believes in such cases the interruption of pregnancy is followed by good results, and is of the opinion that curettage with strict antisepsis seems less of a risk to a tuberculous woman than to allow the pregnancy to run its course. The causes of uncontrollable vomiting are multiple. Most frequently they may be attributed to a pathological condition of the uterus. Readjustment of uterine deviations or cure of uterine inflammations may succeed, but frequently these deviations are of little importance. If the patient can retain no nourishment and is rapidly failing, there remains no means but to induce

labor while the general condition is still fairly good. The statistics of fatal cases of incoercible vomiting are frightful; out of 309 cases the mortality is 55 per cent. Even at an epoch anterior to antisepsis, abortion when produced gave more favorable results than anticipated; but now that antisepsis is practised, it is our duty to provoke premature expulsion as soon as the patient's condition permits. With a multipara curettage may be used, with prompt dilatation. In primiparæ dilatation with prepared sponges or laminaria dilators.

Observations upon 95 Cases Terminated by the Forceps.

Guensbourgue (*Archives de Tocologie de Gynécologie*, 1894, No. 3) reviews the statistics of Huggenberger, Johnson of Dublin, and others, and records his own observations made on 95 cases of forceps delivery, the indications being as given below:

	Times.
1. Exhaustion of the nervous system without uterine feebleness	9
2. Irregularities in fœtal heart beat	9
3. Pelvic contraction, prolonged compression of maternal soft parts and atony	10
4. To avoid mortification of soft tissues of pelvis	25
5. To avoid tears of vagina	4
6. On account of eclampsia and epilepsy	7
7. On account of pendulous abdomen	2
8. Face presentation (once after podalic version)	2
9. For metrorrhagia from uterine fibro-myoma	2
10. For tetanus of the uterus due to abuse of ergot	1
11. For atony of the uterus in primiparæ	24

The results of his operations have been as follows:

For the mother—	Per cent.
1. Mortality	0
2. Afebrile post-partum (in some 69)	72.6
3. Morbidity of light and short duration (20 cases)	21
4. Morbidity of grave outlook (6 cases)	6.3

To infant—

Of 95 infants extracted with forceps, 17 could not be resuscitated, 17.6 per cent.; but if we exclude infants giving no signs of life before intervention, the number falls to 6. In the last 6 cases the death of the child has been caused four times by the difficulty of extraction of the shoulders, and twice by compression of cord. Thus the forceps has occasioned the death of two children, or about 2 per cent.

Episiotomy. This operation was performed 16 times on both sides and twice on one side. The incision extended itself considerably in 2 cases, and but slightly in 6.

Perineal suture in all cases of rupture has given 18 cases with incomplete union, and in 2 cases it has failed from considerable œdema of the parts.

Slipping of the forceps occurred 9 times. The author generally employs the instrument of Lasarewitch.

Of 38 women, 13 had puerperal maladies, 34.2 per cent. in place of 27.3 per cent. of general morbidity in all his cases. 8 women had metrorrhagia

The infantile mortality has been also increased 41.3 per cent. instead of 17.6 per cent.

Complete anæsthesia was employed in 11 cases; of these 4 had uterine inertia and hemorrhage at the moment of delivery, obliging artificial extraction of placenta. Chloral hydrate sometimes gives similar results.

Symphysiotomy.

Toujari (*Annales de Gynécologie et d'Obstétrique*, March, 1894) reports a case of symphysiotomy with favorable results for mother and child. The patient, a rhachitic orange peddler, aged twenty-eight years, had right scoliokyphosis in the dorso-lumbar region, with general contraction of the pelvis. The patient's first labor had been terminated by basiotripsy, delivery by forceps being impossible. In the eighth month of the present pregnancy the fœtus presented by the breech, but subsequently changed spontaneously to a vertex presentation. After fifty hours of vain uterine effort, symphysiotomy was performed in surroundings most unfavorable to the patient's recovery. A space of 25 mm. was obtained after section of the pubic joint and delivery was effected by means of forceps, the uterus assisting vigorously. Recovery was prompt and complete. The child, although somewhat asphyxiated, was quickly resuscitated. The pubic bones were united by two bony sutures of catgut. Five months after operation a measurement of the pelvis gave the following:

Height of pubic symphysis	45 millimetres.
Promonto-pubic diameter	7.5 centimetres.
Coccy-pubic diameter	9 "
Bi-ischiatic diameter	8 "
Bi-ischiatic diameter	9 "

Dystocia caused by Extraordinary Development of the Fœtal Bladder.

Walther (*Zeitschrift für Geburtshülfe und Gynäkologie*, Band xxvii., Heft 2): The case occurred in the clinic of Prof. Löhlein, the mother being a II-para, having had one child by a normal labor. There was no albuminuria or specific history. Up to the time of pregnancy menstruation had been regular. In this her second labor the child presented by the feet, and great difficulty was encountered in extraction, although the soft parts were well dilated. There was but a small amount of liquor amnii, but examination was followed by an amount of amber-colored fluid, after which a dead macerated female fœtus was extracted. The maternal patient recovered and left the hospital at the end of ten days.

On examination of the body of the fœtus it was found that the cause of the dystocia lay in a great dilatation of the bladder, with excentric hypertrophy of its walls, with ascites. Both lungs were in a state of atelectasis. Pericardium showed an old inflammation. Liver and kidneys were enlarged, the left kidney being the seat of beginning cystic degeneration. Ureters were dilated. The following pathological changes were also present: Deficient development of anus and rectum, the latter having a small fistulous

connection with the bladder. Incomplete atresia of the urethra, especially at its central portion. The outer and internal genital organs showed imperfect development, the position of the vagina being abnormal, and there being complete absence of the cervix and of the middle portion of the corpus uteri, through lack of union of Müller's ducts (uterus bipartitus). Traces of an old peritonitis were to be seen in company with the subsequent adhesions of the abdominal organs and the formation of ascites.

GYNECOLOGY.

UNDER THE CHARGE OF

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The Ultimate Terminations of Nerves in the Female Genital Organs.

Gawronsky (*Centralblatt für Gynäkologie*, 1894, No. 11) summarizes the result of his misroscopical studies as follows: There are two sets of nerve fibres in the uterus, one set being distributed throughout the muscular layer without anastomosing, and terminating in multipolar ganglion cells in the submucosa; from these cells spring numerous filaments which enter the mucosa, and terminate either in the epithelial cells or in terminal bulbs. Another set, which also traverse the muscular layers, end directly in the epithelial cells and glands. In the Fallopian tube the nerve fibres interlace freely and give off numerous twigs which terminate in points or bulbs just beneath the epithelial layer. Bundles of nerves can be demonstrated in the parenchymatous zone of the ovary, which do not communicate with one another. In some preparations delicate branches can be traced to the follicles, where they either end directly in the theca folliculi, or enter the latter after a more or less circuitous course. Fibres are frequently seen which end in terminal bulbs in the membrana granulosa. Occasionally fibrils can be traced through the granulosa to the immediate vicinity of the ovum, though it is impossible to establish their ultimate termination.

The nerves in the muscular coat of the vagina present numerous sharp bends; at these points lateral branches are given off which take the same course as in the muscular layer of the uterus. After they enter the submucosa the fibres change their direction, form flexures, and reach the epithelial surface. They terminate in points or bulbs in the deeper layer of epithelium.

Pruritus Vulvæ.

Schultze (*Centralblatt für Gynäkologie*, 1894, No. 12) calls attention to the fact that pruritus is often directly due to the condition of the endometrium. He has repeatedly demonstrated the fact that the irritation of the vulva may

be aggravated by simply passing a sound into the uterus; in fact, sometimes there seems to be a definite limited area of the endometrium, irritation of which gives rise to reflex pruritus. When pruritus and purulent endometritis coexist, the causal relation between the two is sufficiently clear, but it can be demonstrated even when the latter condition is absent. In every obscure case the presence of endometritis should be sought for. According to the writer's observation the majority of patients with obstinate pruritus do not masturbate, and *vice versa*.

The Extra-median Incision in Cœliotomy.

Flatau (*ibid.*) makes his primary incision through the muscle instead of in the median line, and has had no ventral hernia in an experience extending over two years and a half. He cuts through the skin about half an inch to the left of the linea alba and separates the muscular fibres, mainly by blunt dissection, compressing bleeding vessels temporarily, so that the wound is dry when the peritoneum is incised. He disapproves of Abel's plan of cleansing the wound with an antiseptic solution. Silkworm-gut sutures are passed through all the layers of the abdominal wall, including as little as possible of the skin and more of the muscle and peritoneum.

Ligation of the Uterine Arteries in Fibro-myoma.

Rydygier (*Centralblatt für Gynäkologie*, 1894, No. 13) thinks that it is not sufficient to tie the uterine arteries alone in order to arrest the growth of uterine fibroids and to check hemorrhage; the ovarian arteries should also be ligated, on account of their free communication with the uterine. The latter may be secured per vaginam, and the former after opening the abdomen, in cases in which there are numerous adhesions, although in general it is better to tie both from above. The cases in which ligation is indicated are those of interstitial tumors of moderate size, and in which the patient has become so exhausted by repeated hemorrhages that she could not endure a radical operation.

The Operative Treatment of Fibro-myoma.

Lauro (*Riforma Med.*, 1893, No. 9) reports three successful cases of supravaginal amputation, in which the stump was secured with a rubber cord and was dropped back. In each instance the elastic ligature came away through the cervical canal at the end of several weeks.

Zweifel (*Centralblatt für Gynäkologie*, 1894, No. 14) describes at length his method of treating the stump in hystero-myomectomy, which he believes is superior to all that have been devised. After ligating and dividing the upper portions of the broad ligament, the usual peritoneal flaps are dissected from the uterus. The cervix is then ligated in sections, and the mass is excised without much loss of blood. Finally, the stump is covered with peritoneum by suturing the anterior and posterior flaps. The cervical canal receives no special treatment, with the view of destroying septic germs, except in the case of sloughing tumors. Occasionally, if hemorrhage is feared, a temporary elastic ligature is applied, which is removed after the

stump has been ligated. The writer's mortality in 92 cases thus treated was only 3.2 per cent. The comparative mortality by different methods in the hands of various operators he estimates as follows: The method adopted by Schroeder, Martin, Leopold, and others, 25.6 per cent.; the use of the elastic ligature, as practised by Olshausen, Fritsch et al., 24 per cent.; ligation and extra-peritoneal treatment of the stump, 5.2 per cent.

THROMBOSIS FOLLOWING CŒLIOTOMY IN TRENDELENBURG'S POSTURE.

V. STRAUCH (*ibid.*) reports three cases of thrombosis of the veins of the lower extremities (always the left) in nineteen cœliotomies performed with the patient in Trendelenburg's posture, ether being the anæsthetic employed. He attributes this complication to "the specific effect of the ether plus the elevated position," and is resolved in the future to keep the legs of the patient extended.

[The writer's deductions are based on such imperfect data that they are comparatively valueless. Considering the thousands of abdominal sections which have now been performed in this way without similar results, it is only fair to infer that the cause of the thrombosis should have been sought for within the pelvis, and should not have been attributed either to Tredelenburg's posture or to the anæsthetic.—ED.]

THE TREATMENT OF FIBRO-MYOMA WITH CHLORIDE OF ZINC.

CONDAMIN (*Lyon Med.*, May 28, 1893) has adopted successfully the following course of treatment in the case of fibroids which give rise to no symptoms except leucorrhœa and moderate hemorrhage: Pencils of chloride of zinc (50 to 33 per cent.) are introduced into the uterine cavity after previous dilatation and irrigation. The cervix is then tamponed with gauze, and the patient lies on her stomach for three or four hours afterward, being kept in bed for eight or ten days. The sloughs separate on the tenth or twelfth day. The patient has considerable pain and a temporary elevation of temperature. The writer reports twenty cases in which the most satisfactory results followed the treatment.

THE ASSOCIATION OF CARCINOMA AND FIBRO-MYOMA.

GENER (*Centralblatt für Gynäkologie*, 1894, No. 14) analyzes forty-six cases collected from the literature, which he divides into three classes, viz.: Those in which there is primary cancerous degeneration of the myoma; those in which the two exist simultaneously in the corpus uteri; and cases in which myoma of the body is complicated with cancer of the cervix or portio. Ten cases are described as belonging to the first class, but only four are to be regarded as authentic; while there are twenty-three of the second, and twelve of the third.

The writer does not believe that the presence of the myoma bears any direct causal relation to the development of the carcinoma. The diagnosis of myoma of the body complicated with carcinoma of the cervix is easy; in the case of a pre-existing myoma which gives rise to aggravated symptoms at the time of the climacteric, such as pain, hemorrhage, foul discharge, and

rapid decline in health, the suspicion will be awakened that cancer has also developed, but the diagnosis can only be confirmed by curettage.

Extirpation is the only proper surgical treatment. If the uterine tumor does not exceed a child's head (!) it may be removed per vaginam, otherwise by cœliotomy, due care being exercised to prevent infection of the peritoneum by contact with discharges from the cervix, by tamponing the canal with gauze and closing the os with sutures.

Carcinoma of Bartholin's Gland.

Schweitzer (*Archiv für Gynäkologie*, Bd. xliv., Heft 2) reports the case of a woman aged fifty-eight years, who presented a primary cancerous growth the size of a pigeon's egg on the right labium, at the site of Bartholin's gland; the entrance of the duct could be demonstrated on its surface. The inguinal glands were enlarged. Three years later the tumor had increased to the size of a hen's egg, when it was excised, but there was a rapid recurrence in the inguinal glands. The diagnosis was confirmed by the microscopical examination. Primary carcinoma in this region is exceedingly rare, and has not been previously described at any length.

PÆDIATRICS.

UNDER THE CHARGE OF

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ASSISTED BY

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Pulmonary Inflammations in Young Children.

N. Miller, of Moscow (*Jahrbuch f. Kinderheilkunde*, Bd. xxxvii., Heft 2, January, 1894, p. 113), has made an extensive study under this title, from material gathered in the Moskauer Findelhaus, and concludes with the following general propositions:

1. Pneumonia among these foundlings is very common, giving rise to one-third of the total mortality in this hospital.

2. The causes of the frequency of this disease are numerous, being attributable partly to anatomical and physiological peculiarities of the respiratory organs at this time of life; partly to various prejudicial influences, climatic, telluric, hygienic, and hereditary in character, to which these children are exposed, both without and within the institution.

3. Congenital pneumonias were seldom observed, and the diagnosis during life was almost impossible; they are septic or syphilitic. The former are

very often lobar and diffuse, and end fatally in the stage of red hepatization; the latter may appear in different anatomical forms: pneumonia gelatinosa, alba, gummosa, interstitialis fibrosa; but generally congenital syphilitic pneumonias are rarely encountered at birth among those inheriting the syphilitic taint.

4. Acquired pneumonias in such children are either primary or secondary complicating other diseases. The latter are twice as frequent as the former. Broncho-pneumonia, in lobular or lobular-confluent form, similar to the catarrhal pneumonia of adults, is the most frequent primary, as well as secondary, form of inflammation. Much less frequent is the pure lobar pneumonia.

5. Primary pneumonias far oftener than secondary are apt to be purely lobar or croupous in nature; for the most part they are unilateral, and more frequently right-sided. Complicating pleuritis, which is not infrequent, is usually fibrinous, very seldom purulent.

6. Secondary pneumonias are very seldom lobar from the start; usually they are lobular and confluent, becoming lobar by extension, like the catarrhal pneumonia of adults. For the most part they are double; and when, rarely, they are unilateral the right lung is more frequently affected.

7. Primary pneumonia relatively seldom is associated with congenital atelectasis; very often, but not always, it develops from a bronchitis, laryngo-tracheitis, or grippe. The secondary broncho-pneumonias often originate from a hypostasis or in the train of acquired congestive atelectasis.

8. The acquired septic pneumonias are often interstitial, double, and complicated with purulent pleurisy.

9. The so-called cerebral pneumonias, from complicating meningitis, are very seldom observed in these children, as is also the hemorrhagic form of pneumonia; the former complicating quite exclusively the primary lobar form, the latter found relatively often with secondary broncho-pneumonia.

10. As terminations of pneumonia in very young children, rarely observed, were abscess, gangrene, and chronic inflammations; cheesy and tuberculous forms resulting in large cavities and cheesy degeneration of bronchial glands. General miliary tuberculosis was encountered only in exceptional cases.

11. The pneumonias of young children were very often (one-fifth of all cases) complicated with pleuritis, fibrinous forms being observed more often with primary lobar pneumonias, and purulent with lobular broncho-pneumonias. Pleuro-pneumonias were oftener double, and, when unilateral, usually left-sided.

A Case of Anæmia Infantum Pseudo-leukæmica.

Fischl (*Prager medicinische Wochenschrift*, 1894, No. 1) reports a case under this title which offers certain very interesting peculiarities. The patient was a child of little more than a year old, badly nourished, pale, and presenting all the symptoms of grave rhachitis. The spleen was markedly hypertrophied, descending into the pelvis and extending beyond the median line. The liver was also hypertrophied, reaching one and a half fingers' breadth below the border of the ribs. The lymph-glands were enlarged considerably, forming distinct chains. Alternating diarrhœa and constipation were present. The affection had begun about five months before, developing after the first signs of rhachitis were evident, a condition which had only appeared after

the child had been weaned from the maternal breast. When the case was first seen by the author there was already hypertrophy of the spleen and liver, while among the gland groups the inguinal were the only ones visibly affected.

Examination of the blood then showed a leucocytosis of moderate intensity. A complete examination of the blood, made a few days before the report, gave the number of red corpuscles 2,300,000; white corpuscles 250,000, or a proportion of 1 to 9; hæmoglobin 40 per cent. (Fischl). There was consequently considerable leucocytosis. Histologically there was a predominance of monochromatophilic leucocytes with large nuclei, a poikilocytosis, and a great number of erythroblasts of normal dimensions and with nuclei in a state of division.

Passing in review the writings of von Jaksch and other German writers, as well as those of Hayem and Luzet of the French school, the author shows that the case under discussion may be considered equally well as an example of pseudo-leukæmia or as a true leukæmia. The hypertrophy of the liver, the generalized lymphadenitis, proceeding by recurring attacks, and the rapid course are in favor of true leukæmia; while the histological elements of the blood, according to certain writers, would be justly characteristic of that affection. On the other hand, the enormous swelling of the spleen compared with the moderate hypertrophy of the liver and the particular form of adenopathy would suggest a pseudo-leukæmia, a view that would be confirmed by the richness of the blood in erythroblasts and its poverty in eosinophilic elements. The question could probably only be solved at the autopsy, which would determine the presence or absence of the characteristic lesions of the organs and bone-marrow associated with true leukæmia. The author thinks, finally, that the anæmia infantum pseudo-leukæmica of v. Jaksch is not an autonomous disease but a result of a number of debilitating troubles.

This opinion was supported in the discussion by Epstein, who cited a number of cases in which this pseudo-leukæmia was secondary to other morbid states. He has seen it develop in nurslings following chronic septicæmias, attended with the formation of a single or of multiple abscesses, sometimes six to eight months after the primary accident; and in these cases, if the history had not been known, the diagnosis of primary anæmia pseudo-leukæmica would have been made. In other cases this anæmia is observed following a latent tuberculosis of the bronchial and mediastinal glands; after infections of intestinal origin; as a result of hereditary syphilis, the manifestations of which had disappeared after a few weeks; after grave gastro-intestinal troubles, and after rhachitis. Finally, Epstein has observed a series of cases in which malaria could be incriminated as the exciting factor.

A Case of Myxœdema in a Child.

M. Imerwol, of Jassy (Transactions of the Eleventh International Medical Congress, Section of Pediatrics, *La Semaine Médicale*, April 18, 1894, p. 187), reported the case of child four years of age who presented all the clinical symptoms of myxœdema with complete idiocy. Injections of thyroid extract continued for twenty days caused a notable amelioration, as evidenced by the diminution of tumefaction of the skin; the psychic state also improved.

Unfortunately, the child was attacked with erysipelas and died. At the autopsy there was found complete absence of the thyroid. The brain was well developed and weighed 950 grammes. Histological examination of the skin showed that the infiltrating material was fatty, not mucous, the condition being described by the author as a veritable lipomatosis of the skin.

This case adds another to the list of autopsies on such cases recorded by Sick and Nauwerke, Bourneville and Bricon, Bourneville and Pilliet, and Marfan and Guinon (see this department, April, 1894), and emphasizes the plea made by the last-named observers that the erroneous term myxœdema should be discarded in favor of Charcot's—*cachexie pachydermique*.

The Stump of the Umbilical Cord in the Newborn.

Doktor (*Archiv. f. Gynäk.*, 1894, Part 3) mentions three factors which render the stump of the cord an easy avenue for infection. First, the wound involves not only the skin, subcutaneous tissue, and muscular layers of the abdominal parietes, but also includes the peritoneum; secondly, three large vessels are exposed in the stump; and, finally, a quantity of dead tissue must remain in the wound for some considerable time. The author compares the Whartonian jelly to the gelatin employed for bacteriological cultures. When the skin, as sometimes happens, extends some distance along the cord in the form of a tongue-like process, healing is slow. Extension of the attachment of the amnion beyond its normal limit usually results in decided weakening of the umbilical region. The so-called fungus of the umbilicus results from the deeper tissues invading the Whartonian groove and growing upward into the centre of the cord, remaining as a conical projection when the funis separates. Among 462 newborn children observed, an elevation of temperature was noted in 107, and in 42 of these the author was able to trace an infection from the umbilical wound. He states that the original dressing of the cord should not be disturbed, and thinks it better to omit the daily bath for a short time rather than disturb this dressing.

The Obliteration of the Ductus Arteriosus at Birth.

Strassmann, at a meeting of the Berliner medicinische Gesellschaft, April 11th (*La Semaine Médicale*, April 18, 1894, p. 185), questioned the usual explanation of the mechanism of the obliteration of the ductus arteriosus. He states that thrombosis of this canal is very rarely found, and that in all cases in which it is found it is pathological; in the second place, it has never been demonstrated that this canal can contract or bend at the moment of the first respiration to the point of obliterating its lumen.

The author suggests the following explanation as the most rational to his mind: At the moment when respiration is established blood-pressure diminishes in the right heart and pulmonary artery, while it is increased in the left heart and aorta. As a result of this the aortic orifice of the ductus arteriosus receives less blood and is submitted to a mechanical pressure which determines its obliteration. It is known that obliteration does not occur when the respiration is not sufficiently established and the lung remains uninflated. Moreover, the same result obtains when, following a premature respiration, the arterial canal is too distended to permit of its obliteration,

and a condition of asphyxia is induced calling for bloodletting. Obliteration also does not occur when the relations of blood-pressure in the great vessels are transposed, as is observed in cases of malformation of the heart or stenosis of the pulmonary artery or aorta.

All these considerations prove that the aortic orifice of the ductus arteriosus closes mechanically, a fact which permits us to understand its reopening in certain determinate conditions.

To demonstrate his theory the author injected the vessels of a number of fœtuses with a coagulable liquid. While with the pressure of 100 mm. of mercury the arterial canal could not be injected by way of the aorta, this could be done with great ease, even eight days after birth, by injecting by way of the pulmonary artery. To inject by way of the aorta it was necessary that the fœtus should not be completely developed (not later than the beginning of the eighth month with the human fœtus), or that the arterial duct should have a certain width from premature respiration, or that the pressure in the aorta be very high.

A Case of Melæna Neonatorum.

Schütze (*Centralblatt f. Gynäkol.*, 1894, No. 9) reports a case in a strong male infant born at term of a mother sixteen years of age. The cord was twisted once around the neck but not tightly enough to cause an asphyxia. The left parietal bone was imperfectly ossified, one part crackling like parchment when pressed. Forty-four hours after birth the child passed blood freely from the bowel, but the hemorrhage was checked by cold gruel enemata containing a few minims of perchloride of iron. Twenty-four hours later the child was very anæmic and cold, though no more blood had been passed, and the abdomen was not swollen. A few hours later blood was again passed at stool and was also vomited. Collapse ended in death an hour later. The umbilicus and its vessels were found healthy, but the mouth was full of dark tea-colored blood, as were also the pharynx, œsophagus, trachea, bronchi and larger tubes, the stomach, the lower part of the ileum, and the large intestine. No ulceration of the intestinal mucous membrane could be detected; the duodenum, jejunum, and upper part of the ileum were empty. The lungs were very emphysematous. There were ecchymoses of the dura mater.

Periods of Isolation for Contagious Diseases of Childhood.

In the course of a report upon this subject, Ollivier (*Gazette Médicale de Strasbourg*, 1894, No. 2, p. 17) makes the following rules:

For scarlatina, variola, varioloid, and diphtheria, the period of isolation, before the child is allowed to return to school, should be forty days, counting from the first day of invasion.

For measles and varicella sixteen days will be sufficient.

For pertussis isolation should be prolonged to three weeks after complete cessation of the characteristic kinks.

For mumps, ten days after the disappearance of the local symptoms.

Nasal, buccal, and pharyngeal irrigations with antiseptic solutions should be employed, and soap bath and rubbing of the entire surface and scalp should be a necessary preparation before returning to school.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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Fever.

With the development of our knowledge of the acute infectious diseases, has arisen the theory that the fever occurring as a part of their clinical picture is the result of the action on the body of certain diffusible products of the bacteria which are their cause. With a view to adding definiteness to this theory, Centanni has undertaken an exhaustive study of the fever of the infectious diseases, his investigation being directed to the determination of the following points: 1. What are the agents which cause the fever in these diseases? 2. What is the mechanism by which they act? 3. What therapeutic deductions are possible from the facts developed? The work is not yet completed, but a number of facts bearing upon the first question have been discovered, and form the basis of a preliminary paper upon the Fever-producing Poison of the Bacteria.—*Deutsch. med. Woch.*, 1894, Nos. 7 and 8.

The investigation extended to seventeen pathogenic species, seven non-pathogenic, and to cultures made from air, water, putrefying animal matter, and urine, without any attempt to separate or identify the several species. From cultures of these germs, *devoid of peptone*, Centanni obtained, by repeated precipitation with alcohol and dialysis, a substance whose chemical properties are quite distinct from those of the bacterial poisons heretofore described (ptomaïnes, enzymes, toxalbumins), and which, when injected into animals, causes fever, prostration, loss of flesh, and finally death, if continued. This substance, which Centanni believed to be the same in all species of bacteria, is designated by him "pyrotoxina bacterica." It is believed to be in some way derived from the protoplasm of the germs, or to be elaborated by it, and its production is thought to be a quality of all bacteria. He is led to believe that the fever accompanying the acute infectious diseases in man is due to an intoxication of the system by this poison, and explains the irregular course of the fever in the different diseases by the theory that the poison depends for its elaboration upon variable conditions, and that it is these conditions which are different in the various diseases and at different times in the same disease, not the poison.

Pyogenic Micrococci in the Blood in Phthisis.

The large number of bacteria, other than the tubercle bacilli, usually present in the sputum of phthisical patients in whom breaking-down of the lung tissue is associated with more or less fever, and the fact that these bacteria have been shown by cultures to belong in most cases to the group called "pyogenic," have suggested that much of the consolidation of the lung, and, per-

haps, the rise of temperature also, might be dependent upon a "mixed infection" with these pyogenic bacteria. Believing that if the fever were due to the action of these germs it must be regarded in the light of septicæmia, in which case the bacteria producing it would be found in the blood during the febrile exacerbations, JAKOWSKI (*Centralb. f. Bakt.*, Dec. 9, 1893, 262) has examined the blood of nine patients suffering from advanced phthisis, with the result of finding the pyogenic bacteria in seven. Staphylococcus pyogenes aureus was present in five of the cases; streptococcus pyogenes in three, these two germs being found associated in one case. It is of interest that in one case, seen early in the disease, the examination of the blood was negative until signs of cavity developed, when both staphylococcus and streptococcus were found.

CHEESY PNEUMONIA.

As bearing upon the same question of mixed infection in phthisis we may summarize the conclusions reached by FRAENKEL and TROJE (*Zeitschr. f. klin. Med.*, xxiv., 1894), after an exhaustive study of cheesy pneumonia, that condition above all others in which the combined action of other germs with the tubercle bacillus might be expected. The paper is based upon thirteen carefully studied cases, the first part being devoted to the clinical histories, the second to the pathological anatomy as developed at the autopsies.

The clinical features of the cases in question may be summarized somewhat as follows: A previously healthy individual, often quite robust and without hereditary predisposition, is rather suddenly taken sick with fever, cough, and prostration. When seen by the physician the signs of one-sided consolidation of the lung, usually at the base behind, are present. The sputum may resemble that of acute lobar pneumonia, and in this early stage the differential diagnosis of the tubercular from the latter affection may be impossible. Usually, however, the course of the disease is more protracted than that of lobar pneumonia, the fever continuing after the usual time of crisis in that disease. Paleness of the face, sweating and progressive emaciation; continuance of cough, with often bright-green expectoration, in which careful search reveals tubercle bacilli; the presence of the "diazo reaction" in the urine; and the absence of a degree of dyspnœa and cyanosis, which would be expected with the amount of consolidation and prostration present, serve in the later stages to differentiate this disease from the more common lobar pneumonia. In from two to twelve weeks the patient dies of exhaustion.

At the autopsy one or more lobes of the lung are found consolidated, usually of a grayish color, and somewhat mottled appearance. In about one-half the cases one or more small cavities are present. The mottling of the consolidated lung is found to depend upon the presence of irregularly-shaped larger or smaller areas of cheesy material around which are more translucent areas spoken of as gelatinous in appearance. These are irregularly distributed and merge into one another, producing considerable variety of appearance. Tubercular bronchitis is frequently present.

Microscopical examination shows but little change in the tissue of the lung in comparison with the great amount of exudate which has accumulated in the air vesicles. This is essentially composed of exfoliated and

swollen alveolar epithelium, though fibrin and the organized constituents of the blood are also present. The cheesy areas show that coagulation necrosis has very quickly destroyed the exudate. Miliary tubercles are often found scattered about in the portions of lung less intensely diseased, but they never form an important feature of the lesion, which is essentially a pneumonic exudative process. Yet bacterial examination of the sputum during life and of scrapings from various portions of the consolidated lung after death revealed to Fränkel and Troje only tubercle bacilli in all but one of the thirteen cases, and the importance of this fact as militating against the theory of a necessarily mixed infection in the so-called pneumonic variety of phthisis can hardly be overestimated. There could be no doubt that in twelve of the cases studied an exudative pneumonic process had been caused by the tubercle bacillus.

Animal experiments demonstrated that similar lesions to those observed in man could readily be produced in rabbits by intra-tracheal injection of pure culture of tubercle bacillus, and subsequent bacterial examination of the lesions showed that here also no other germ had been at work.

The conclusion is then inevitable that, though other bacteria may at times be associated with the tubercle bacillus in the lesions of phthisis they are in no way an essential etiological factor in the process, and the differences in lesion between the exudative form of tuberculosis of the lung and the form in which tubercles made up more or less of new reticular connective tissue form a predominant element, are believed by Fränkel and Troje to depend upon a different mode of infection in the two cases, the bacilli being in the air vesicles in the former case, to which they have gained access by inhalation, while in the latter they are in the walls of the vesicles, whither they have been carried by the blood or lymph.

Viability of the Pyogenic Micrococci.

A somewhat remarkable case of osteomyelitis is reported by Schnitzler (*Centralb. f. Bakt.*, xv., 1894, 270), which illustrates the long viability of the pyogenic cocci under certain circumstances. The patient, a man forty-two years of age, had suffered from an acute osteomyelitis of the right tibia when a boy of seven. There was then discharge of pus and bone from the tibia with resultant sinus formation. The sinus healed in about six months, and he remained well during *thirty-five* years. In August, 1892, the right shin began to be painful, and he had occasional irregular fever. After four months of these symptoms he presented himself for treatment at the hospital. Operation showed thickening of the tibia in the site of the old sinus, but no fistulous opening could be found, and healing of the old process of thirty-five years before appeared to have been complete until, on chiseling into the bone, an old cavity about the size of a walnut was discovered. This cavity contained a few fragments of bone and a small amount of pus. It was surrounded by a dense layer of bone and was lined with granulation tissue. The contained pus and portions of the granulation tissue removed with the sharp spoon were examined bacteriologically, with the result of obtaining pure cultures of the staphylococcus pyogenes aureus, which inoculations into rabbits proved to be virulent.

Because of the dense tissue surrounding the abscess in the bone, and because no fresh source of infection could be discovered, Schnitzler feels compelled to believe that germs pocketed in the bone during the primary infectious process had transmitted their virulence through the many generations which must have existed during the thirty-five years which had elapsed between the primary disease and the subacute relapse.

In support of this view reference is made to similar cases reported by Krause, Ressemann, and Müller, in which abscesses of bone developed in the site of suppurative processes which had "healed" thirty, thirty, and four years before respectively.

Tuberculosis of the Placenta.

At the meeting of January 10, 1894, of the Berliner medicinische Gesellschaft, Lehmann (*Deutsche med. Wochenschr.*, 1894, No. 4, p. 87) demonstrated a placenta in which there were areas of tubercular inflammation containing tubercle bacilli in abundance. The placenta came from a woman who was suffering from chronic phthisis, and whose child had died ten days after birth, but without lesions of tuberculosis. The presence of the lesions and of the bacilli in the placenta clearly shows a mode of direct transmission of the infectious material from mother to fœtus, which is probably more frequent than has been supposed. (*Cf.* The American Journal of the Medical Sciences, March, 1893, p. 358.)

Muscular Rheumatism.

The work of Sahli, upon articular rheumatism, has suggested to Leube (*Deutsche med. Wochenschr.*, 1894, i., No. 1) a microbic etiology for muscular rheumatism. Three cases are cited in which typical muscular rheumatism was complicated by endocarditis, and this, with the epidemic occurrence of the disease at times, its accompanying fever, and its occasional development into typical articular rheumatism—as occurred in the first of Leube's cases—lead him to regard muscular rheumatism also as an infectious disease, and as due in all probability to the same cause as the articular variety.

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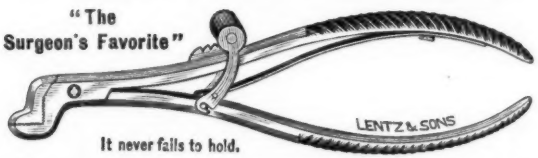

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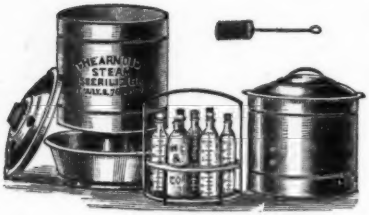

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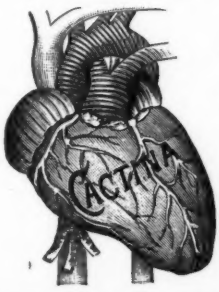

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The ordinary tonics—iron, quinine, strychnine, &c.—seem utterly unable to cope with this condition. In fact, it is not stimulation that the patient needs, as by it he is only led to overtask his strength, and finally finds himself completely broken down. He needs a reconstruction of the worn-out tissues.

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VOL. CVII., No. 6. JUNE, 1894. No. 266.

THE

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OF THE

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Published Monthly.

EDITED BY

EDWARD P. DAVIS, A.M., M.D.

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